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ABSTRACT

Six global objectives--energy, earth resources, waste disposal, population, interdependence, and quality of life--are used as a framework in preparing this open design for environmental education, one which emphasizes behavioral change in the affective domain. To aid classroom teachers in achieving these goals, the guide is divided into five sections. Part 1 deals with the role of the teacher in the classroom situation and covers teaching strategies which recognize environmental education as future oriented, problem focused, interdisciplinary, student initiated, and community centered. In Part 2 each global objective is restated with specific supporting instructional objectives. For each specific objective, the grade level and subject areas into which it may be logically infused are suggested. Part 3 develops several model units for grades K-12 incorporating the instructional objectives, possible student activities, and teaching aids. Suggestions for implementation of an on-going environmental education program in terms of the responsibilities of the district are provided in Part 4. The final section gives names and addresses of agencies and individuals who can provide free and inexpensive materials to supplement the environmental education program. (BL)

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an
open design*
to
real life
learning experiences**

TOTAL ENVIRONMENT EDUCATION

pilot copy

*This is not a curriculum guide.

**The first law of the process of environmental education: An experience is worth 1,000 pictures.

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"Total Environment Education: An Open Design To Real-Life Learning Experiences" is printed in this form in limited numbers to be used only as a means to pilot test it's effectiveness, format and approach. Your comments are encouraged and will be given full consideration as we edit the Design following several pilot workshops prior to its official publication by the Indiana Department of Public Instruction.

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I. ENVIRONMENTAL EDUCATION: WHAT IT IS

Many Americans are concerned about the degradation of our environment which diminishes the quality of the human experience through: water deterioration waning wildlife, urban sprawl, preempted open spaces, vanishing wilderness, noise, landscapes scarred by highways, litter, and blight. This crisis is decreasing beauty and increasing contamination, thus threatening not only the pursuit of happiness, but also life itself.

Action to conserve the environment and to redevelop and maintain it will require a sense of husbandry and a sense of responsibility on the part of every American citizen. Unthoughtful people pollute the environment. Thoughtful people can effect a new environmentalism dedicated to: restoring as well as protecting; bringing beauty to the cities as well as the countryside; minimizing the waste of technology as well as natural resources; halting the massive deterioration of the environment as well as husbanding resources and values essential for the prosperity of the human spirit.

This, then, is environmental education: a recognition by man of his interdependence with his environment and all of life and his responsibility for developing a culture which maintains that relationship through policies and practices necessary to maintain an environment fit for life and fit for living.

What is the difference between the new "environmental education" and the older "conservation education"? The newer term attempts to more precisely describe our ecological efforts to come to grips with the degradation of man's interlaced surroundings.

The scope of the new environmentalism is all encompassing. Whereas yesterday soil conservation, water conservation, forest conservation, wildlife conservation, etc., were treated as separate units; today the ecological unity of all man-land relationships is the unit for study. Thus, the focus of the new environmentalism is man-centered; i.e., the primary concern has shifted from the survival of remnant redwoods and other endangered species to the survival of nothing less than the human species itself. The concern is not so much on quantities of natural resources as on the quality of the human experiences. Where conservation conjured up images of open country, environmentalism incorporates the pressing problems of the city. The emotional underpinnings of the new environmentalism is based more on fear for man's tomorrow than on a love for nature's yesterday.

It is in its basic cultural orientation, however, that the new environmentalism differs most strikingly from its antecedent--conservation. The latter, in the words of Gifford Pinchot, stood clearly for economic development, for the infinite goodness of American "progress". But environmentalism reflects a growing suspicion that bigger is not necessarily better, slower can be faster, and less can be more. [1]

1. Comments above adapted from an article by: Schoenfeld, Clay, "Toward a National Strategy for Environmental Education"; The Journal of Educational Research, Vol. 64, No. 1, Sept. 1970, p.p. 5-11.

These principles suggest that the curriculum emphasis of environmental education be the development of a citizenry knowledgeable of the biophysical environment and associated problems, capable of resolving them, and motivated to do so. The inclusion of environmental education in the school program is a response to a need--a need for citizens who can identify and resolve problems affecting the quality of the environment. Good citizenship is already a goal of the school. Environmental education helps the school achieve it, not by adding a new subject area to an already overcrowded curriculum, but by working through existing curricula to make education relevant and responsive to societal needs. Its objective is the development of strong, rational attitudes essential to the development of values which will motivate action to resolve environmental problems.[2]

2. Comments above adapted from the definition of environmental education: Organization and Operation, Regional Environmental Education Center, Yarmouth, Maine.

II. THE STATE ENVIRONMENTAL EDUCATION DESIGN

Six global objectives have been used as a framework in preparing this open design. These global objectives emphasize behavioral change in the affective domain. As students progress through a set of learning experiences, the major goal should be to change attitudes. The six global objectives are:

A. The student will voluntarily propose rational arguments for wise use of traditional sources of energy and will also support expenditure for research and development of alternate energy sources.

B. When faced with decisions concerning the use of earth resources, the student will choose practices developed in recognition of present and future needs.

C. The student will voluntarily become purposefully involved in activities regarding waste disposal problems.

D. The student will demonstrate his awareness of population problems by rationally defending a position on population management.

E. The student will demonstrate an appreciation for the interdependence of living things in the closed earth system.

F. The student will examine optional courses of action and their consequences for improving the quality of life and will support those that will provide optimum short and long term benefits for himself, society, and the environment.

To aid classroom teachers and school districts in achieving these goals, this guide is divided into several chapters.

Chapter III deals with the role of the teacher in the classroom situation.

In Chapter IV each global objective is restated with specific supporting instructional objectives. The lists of specific objectives also contains indicators of the curriculum area where it is believed they most logically fit.

Chapter V develops several model units incorporating the instructional objectives, possible student activities, and teaching aids.

Chapter VI provides suggestions for implementation of an ongoing environmental education program in terms of the responsibilities of the district.

Section VII provides names and addresses of agencies and individuals who can provide free and inexpensive materials to supplement the environmental education program.

III. CHALLENGE TO THE ENVIRONMENTAL EDUCATION TEACHER

To teach students so that they will become rational decision-makers capable of confronting the continually changing problems of society, the teacher must assume the role of one who arranges conditions so that a student will become a manipulator of ideas rather than one who memorizes a daily diet of information and education artifacts. To teach for the future, it is essential that teachers assist students to refine the basic rational thinking skills.

To develop these skills the teacher gently guides by questioning, observes and listens carefully to the thoughts and questions of the students and suggests possible approaches to the solutions of student problems without giving away the answers. The teacher provides time for ideas to form, time for the students to internalize what they are learning and time for the formation of values.

It is also the role of the teacher to hypothesize the performance that can be realistically expected from each student and to sequence cognitive activities into a hierarchy which will give the best assurance that each student will reach the hoped-for attitudinal goal.

TEACHING STRATEGIES*

A. Environmental Education is Future Oriented

At present, much of our school curriculum is a study of what has taken place, in history, in science and in social studies. But that is past and our students are living in the present and rushing toward the future. It is simplistic to assume that the implications of the past for the present or the future are obvious. Neither implication nor application will be seen or understood unless given the light of future orientation by the teacher.

Environmental education recognizes that change is a major characteristic of contemporary society and that the "sabre tooth curriculum" can no longer suffice in such a society. This means that not a day should go by in a classroom without projecting the future role of the students via the content that is being considered. It means that the history teacher examines what is being taught about the past in light of the implications it holds for the student and his future. It means that the biology teacher examines the role of DNA, not only from the point of view of the structure of the discipline and the scientific processes which produced it but also from the point of view of the implications for man and society and the quality of life, one year, five years, and ten years from now. And it means that questions of values need to be raised about whether we in fact want to go down the road toward that particular future and what our alternatives are.

* The University of Wisconsin - Green Bay 1972

Environmental education recognizes that man has a hand in shaping his future and that we as teachers have a hand in helping students develop the strategies and means for at least in part determining their own future. Future orientation can be adopted immediately as a teaching strategy within the present curriculum. It is essential to environmental education and to scientific literacy which has been a goal of educators for a number of years.

B. Environmental Education is Problem Focused Learning

Problem-oriented education requires experience in applying knowledge to a particular problem area drawn from the place where we live; our environment. It is experience in using the power of developing knowledge in arriving at a better understanding, if not a solution to the problem. The first requisite of a problem is that a conflict exists for the individual. In other words, what may be a problem for you and me may not even be of interest to a student. Therefore, many of the problems which we find of great interest within our disciplines or within our textbooks, may not even communicate as problems to a high school youngster.

The nature of the problem depends upon where the student is. Biological problems of ample dimensions exist in the rural areas of Indiana as well as the core areas of Chicago, Philadelphia or Los Angeles. This suggests that for the high school curriculum, environmental education requires every teacher to apply the knowledge that is being developed to a situation which is available firsthand for the students.

C. Environmental Education Is A Recognition of Man in Society

It requires the physics teachers to examine the scientific principles under consideration from the point of view of their relationship to man in society, not merely from the point of view of the isolated academician in an ivory tower. The questions of social relevance, of social value and of man's social responsibility to his environment become the concern of teachers of English, teachers of biology, teachers of chemistry--of all teachers. It requires a new social responsibility for the teacher which emphasizes the role of the student as an integral part of society--man in society.

D. Environmental Education Is Inter-Discipline Education

At present, high school and college curricula alike are most frequently organized in terms of the disciplines of chemistry, biology, English, mathematics, etc. While it is true that these divisions of human knowledge and activity have been of great convenience to the producers of such knowledge (the university academicians), it is not necessarily true that these are the divisions most appropriate to learning and most relevant to the needs of society.

If we admit that environmental education is problem focused and is future time oriented, then the knowledge, the concepts, the processes of the various disciplines must be integrated and applied to a given problem. It is crucial for the student to see that a problem, such as a polluted stream, must be approached from the point of view of several disciplines and that each approach will produce different and not readily compatible answers.

Each analysis, be it scientific, sociological, political or economic, produces information and constraints which must be taken into consideration as necessary but not sufficient bases for decision making. In most instances nowhere in the school curriculum do students find the opportunity to do a multi-disciplinary analysis of a single problem and to bring into confrontation the divergent results of these analyses.

Environmental education pre-supposes the existence of such inter-disciplinary approaches to learning situations and it assumes full involvement of teachers with students. It is based on the reality that students will be confronted with such inconsistencies of information in decision making outside of the schools. Yet many schools are not yet equipped for this kind of inter-disciplinary learning.

It is unfortunately true that in some schools, students are frequently the only inter-disciplinary individuals. And they are inter-disciplinary only because in their daily class schedules they cut across four or five different instructional bases.

E. Environmental Education Is Student-Initiated Learning

If we expect students to take the initiative in producing new information and to make rational decisions after they leave school, then such experience must be provided and expertise developed within the school program. Environmental education requires that the students have a major role in initiating their own conditions for learning, in selecting the problem on which they will focus, in discussing with the teacher, the orientation and biases of the material under consideration, and in examining the social interaction of the

knowledge and problems under consideration.

F. Environmental Education Is Community Centered

Environmental Education requires that individuals from the community, urban leaders, representatives of municipalities and industries, be brought into the schools in an instructional capacity, not to supplant the teacher but to supplement what is going on in the classroom. Environmental education assumes that the students can get out into the community and can take a critical and responsible look at what is happening in their community. It is an honest approach to the problems of a changing society.

IV. ENVIRONMENTAL EDUCATION INSTRUCTIONAL OBJECTIVES

Learning activities can be organized most effectively by carefully describing a sequence of observable and measurable behavioral changes which are indicators that desired steps in learning process have occurred. Although specific instructional objectives aid the teacher in effectively assessing the progress of the student and prescribing challenging new experiences for him, it is unlikely that any set of prestated instructional objectives will ever circumscribe the learnings that even one student will absorb from an organized series of experiences. As a teacher gains experience in preparing and implementing instructional objectives and using them as a criteria for assessing individual student learning, he will increase his capability to describe more completely all learning outcomes in behavioral terms; however, this ability can never be entirely perfected. Also, the action described by any behavioral objective only identifies an overt student behavior which may indicate that the desired learning has occurred; it is only after the student displays many varied actions over a considered period of time that there can be real assurance that he had a complete learning experience. For the reasons above, any behavioral objectives will only partially describe the hoped-for learning outcomes.

As a school district accepts its responsibility to infuse an environmental emphasis into its curriculum, it may need suggestions about the kinds of activities which will aid students in eventually internalizing an environmental ethic. To assist you in this endeavor, a series of instructional objectives are included in the design for your consideration and as initial pool from which you can draw as you begin developing a program.

In writing these objectives, the committee has tried to avoid describing specific activities but to keep each one broad enough that a variety of activities can facilitate its achievement. It is hoped that as teachers and local curriculum committees examine these objectives for ideas to use in the development of its program, many possible locally applicable activities will emerge and other objectives and activities will be developed which extend the program beyond the limits rather loosely defined by their particular objectives.

The objectives in the design have been written and classified under the six major global objectives. For each objective, the grade level and subject areas into which it may be logically infused has been suggested. Writing activities for each instructional objective was considered but classroom teachers should be more qualified to develop specific activities

which will meet local needs and conditions; however, four model units containing possible learning activities have been included in Chapter V.

Remember this is not a curriculum; it is only a guide your school district may use in enriching the existing curriculum.

The coding in this guide for curriculum area is:

(A)-Art; (E)-Economics; (H)-Health; (H. Ec.)-Home Economics; (LA)-Language Arts; (M)-Mathematics; (Psy)-Psychology; (Sc)-Science; (SS)-Social Studies; (VA)-Vocational Agriculture.

Global Objective A: The student will voluntarily propose rational arguments for wise use of traditional sources of energy and will also support expenditure for research and development of alternate energy sources.

Suggested Grade Level		Instructional Objectives: Provided with the necessary activities, experiences, data and information the student will:	Suggested Curriculum Areas
K-3	1.	identify and or name sources of energy which he uses in his daily life.	Sc., S.S.
K-3	2.	trace items of clothing and food back to their energy source.	Sc.
K-3	3.	bring to class examples of energy being misused.	Sc.
K-3	4.	identify two examples in his school where energy is being managed or mismanaged.	Sc.
4-6	5.	use the oral, written word or the dramatic arts in a creative way to portray his dependence on the sun.	Sc., L.A., A.
4-6	6.	identify problems and advantages associated with the production of electricity from chemical, thermonuclear and solar energy sources.	Sc., S.S., H.
4-6	7.	give examples of how the availability of energy and economic growth are inter-related.	Sc., S.S.

4-6	8.	relate how pollution and resource depletion result from an increased demand for energy.	Sc., H., S.S.
4-6	9.	propose options to the internal combustion engine as a main source of power for public transportation.	Sc., S.S.
4-6	10.	compare life styles of societies having access to different energy sources.	Sc., S.S.
4-6	11.	list changes he can make in his own living habits which would place less demand on available energy sources.	Sc., S.S.
4-6	12.	relate increasing world population to future energy problems using objective arguments.	Sc., S.S., H.
7-9	13.	collect data on petroleum reserves and suggest practices which would slow the depletion of these reserves.	Sc., S.S.
7-9	14.	list and describe ways your community can reduce electrical energy consumption.	Sc., S.S.
7-9	15.	collect data on solid fossil fuel reserves and discuss the environmental impact of utilizing these reserves in various energy consumption modes.	Sc., S.S., H., H. Ec., V.A.
7-9	16.	discuss the feasibility of converting the electrical energy industry to a nuclear power base and compare the merits of such a proposal with other optional basic energy sources.	Sc., S.S., H., L.A.

7-9	17.	defend the position with examples, "as population expands faster than energy sources, the environment will not sustain life in a quality manner."	Sc., S.S., H.
7-9	18.	develop programs which will promote concern for avoiding exploitation of our energy resources.	S.S., H., L.A.
7-9	19.	list convenience products (including packaging items) which he uses daily, describe their impact on our energy reserves and identify related habits he should develop to reduce this impact.	Sc., S.S., H., H.Ec., A.
7-9	20.	plan and carry out activities which reduce energy consumption created by the school and its environment.	Sc., S.S.
7-9	21.	predict the resulting damage to energy resources from data regarding production and consumption of large industrial plants.	Sc., S.S.
7-9	22.	discuss how changing to battery, or electric powered cars, could simply be a shift from one pollution problem to another.	Sc., S.S., H., L.A.
7-9	23.	explain how we utilize more energy (calories) in cultivating an acre of land than is produced by crops and discuss why such "tradeoffs" will eventually drain our fossil fuel reserves.	Sc., S.S., V.A.
7-9	24.	identify energy problems that will be serious by the year 2000 if current practices are not changed. Suggest necessary changes.	Sc., S.S.

7-9	25.	identify problems which result from economic development practices which can disrupt and eventually destroy the natural energy flow through plants and food chains.	Sc., S.S., H., V.A.
7-9	26.	use various media to demonstrate the dependence of man upon the sun for energy supplies.	Sc., L.A.
7-9	27.	compare and contrast modern and ancient concepts of sun and of God and write an essay illustrating the importance of the sun on his life through the study of mythology.	Sc., L.A.
7-9	28.	demonstrate, through dramatization, ways in which man's desire for economic gains have produced energy losses.	L.A., S.S.
7-9	29.	offer evidence in an oral interpretation of the need for the management of our energy resources.	L.A., S.S.
10-12	30.	collect data on the current rate of energy consumption and predict either the zero supply date or the steady-state date for two or more sources of energy.	Sc., S.S., M.
10-12	31.	project the environmental impact of the utilization of various energy sources. This impact study should consider not only the effects of the waste products of the utilization process itself but the environmental degradation that results from securing, transporting and processing the energy source for utilization, i.e., final consumption, and the energy requirements for these processes.	Sc., S.S., H.

10-12	32.	analyze man's needs for a complete livable life style in terms of his energy requirements (both direct and indirect) and combine this information with that derived from the two objectives above to suggest the best energy source to be utilized in providing for each need.	Sc., S.S.
10-12	33.	analyze the American life style in comparison with various other life styles and suggest potential changes in the American life style which would place less strain on the world's energy pool and the environment in general.	Sc., S.S.
10-12	34.	discuss the feasibility of discovering and developing new energy sources as others are depleted, e.g. undiscovered fossil fuel beds or improved technology for harnessing current resources.	Sc., H.
10-12	35.	project how implementing an apparent solution to a pollution problem may increase the demand on the earth's energy resources.	Sc., S.S., H.
10-12	36.	construct the food web for two or more dietary systems of different human societies and the corresponding food pyramids to compare the effects of various diets on the world's energy pool.	Sc., H.Ec., H., V.A.
10-12	37.	project the total environment cost of different modes of transportation that could be used for moving goods and/or people and select the one or the combination of modes which will provide an optimum balance in terms of energy conservation, environmental poisoning and human convenience.	Sc., S.S., H.

10-12	38.	propose mechanisms based on the second law of thermodynamics for harnessing the "enthalpy to entropy energy flow of the earth system, the solar system and/or the universe. He may also: 1. evaluate the feasiblility of implementing his proposal 2. prepare a program to present the need for his proposals to his classmates, the community or other groups, or 3. construct a working model of his proposal.	Sc., S.S., H., L.A., A.

Global Objective B: When faced with decisions concerning the use of earth resources, the student will choose practices developed in recognition of present and future environmental needs.

Suggested Grade Level		Instructional Objectives: Provided with the necessary activities, experiences, data and information the student will:	Suggested Curriculum Areas
K-3	1.	describe and diagram their own community showing where water and food is obtained and liquid wastes are disposed.	S.S., H.
K-3	2.	list the observations made with his five senses while walking through the neighborhood, a woods, etc.	S.S., L.A.
K-3	3.	distingquish between the needs and luxuries of a family by classifying pictures into these groups.	S.S., L.A.
K-3	4.	indicate when various foods are shipped in to his area by placing a W (Winter) and/or S (Summer) by pictures of the foods or their names in a listing.	S.S., L.A.
K-3	5.	construct a scrapbook or other device which illustrates the needs of man--clothing, food, fuel, shelter and their plant, animal or mineral source.	S.S., L.A.

K-3	6.	name examples of how needs and luxuries both use up natural resources and cause pollution.	Sc., S.S.
K-3	7.	classify environmental changes from before-after picture sets as natural or man caused.	S.S., Sc.
K-3	8.	label rings on a stump or log cross-section which came into being at the same time as various events in his or his family's life.	S.S., M.
K-3	9.	identify uses man makes of trees or other similar items (shade, lumber, paper, bows, arrows, furniture etc.)	S.S., Sc.
K-3	10.	record by pictures or stories the appearance of a tree or bush at the various seasons of the year and write a poem, verse or story describing the change.	L.A., A.
K-3	11.	present a program dramatizing why forest fires should be prevented and discuss how to prevent them.	L.A., S.S.
K-3	12.	record wildlife he has seen in a given time noting the animal, date, time and location.	S.S.
K-3	13.	express his views, through dramatization or discussion, of the proposition: "Killing wildlife for man's sporting needs is good."	L.A., Sc.
K-3	14.	locate water supplies in his community which may soon become unusable because of pollution.	Sc., S.S.

K-3	15.	name ways he contributes to pollution each day and suggest steps he might take to decrease his contribution.	L.A., H., S.S.
K-3	16.	observe and record for one day signs of pollution in his environmet.	L.A., H.
K-3	17.	name three pleasant and unpleasant odors and identify their source.	L.A., Sc., H.
K-3	18.	identify places where there is a lack of air. (plastic bags, trunks, sand banks, etc.)	L.A., H.
K-3	19.	list words that tell about the conditionsof the air. (Write a poem or phase about air.)	L.A., H.
K-3	20.	list ways he uses water in his daily living.	L.A., S.S.
K-3	21.	construct a rain gauge, record amount of rainfall, compute how much water fell on school grounds, establish water needs of school.	Sc., H.
K-3	22.	describe or illustrate the path that a stream takes noting sources of pollution and discuss changes in its character along its course.	Sc., H., L.A.
K-3	23.	use the oral or written word or the dramatic arts, to portray his depenence on clean water.	L.A., H. Sc.
K-3	24.	describe or illustrate how land is used in his community.	Sc., S.S.
K-3	25.	identify areas where erosion is in evience.	Sc., S.S.

K-3	26.	examine a cubic foot of earth, list his findings and report this data to class.	Sc., L.A., M.
K-3	27.	plant similar seeds in different kinds of soil and record the difference in their growth when given similar amounts of water and sunshine.	Sc., M.
K-3	28.	plant and cultivate a flower or vegetable garden at home or school and identify ways he controlled the environment to produce his desired ends.	Sc., S.S.
K-3	29.	rank modes of transportation according to impact on resources using modes such as wagon, airplane, foot, car and train.	L.A., S.S., H.
K-3	30.	locate resources in his neighborhood, community, and county which will soon be unavailable to him.	Sc., S.S., H.
K-3	31.	name resources which he uses and classify those which are renewable and those which are not.	Sc., S.S.
4-6	32.	name and classify individuals upon whom he is dependent for his basic needs.	Sc., S.S.
4-6	33.	identify problems involving soil, water, air and plant life in his community and suggest and defend a plausible solution to the problems.	Sc., S.S., H.
4-6	34.	illustrate that resources such as iron, coal, and minerals are not renewable and must be carefully conserved, recycled, or new alternatives found.	Sc., S.S.

4-6	35.	give examples which demonstrate how the exhaustion of one resource produces demands on another.	Sc., S.S.
4-6	36.	explain how the United States is affected by natural resources not being equally distributed over the earth.	S.S.
4-6	37.	discuss the concept of the earth as a spaceship with limited resources and a limited capacity for recycling.	Sc., S.S., H.
4-6	38.	identify political, social, ethical, and industrial motives for proposed laws governing conservation of natural resources.	Sc., S.S., H.
4-6	39.	develop a model to demonstrate water as a renewable resource.	Sc., S.S., H.
4-6	40.	write an imaginative story about a drop of water's journey through the water cycle.	Sc., L.A., H.
4-6	41.	compute gallons of water produces during a one inch rainfall on a specified area of ground.	Sc., M.
4-6	42.	estimate the cost of water he uses per year if water cost 10¢ per gallon.	M.
4-6	43.	explain how large bodies of water affect the climate in his locality and discuss how climate affects human behavior.	Sc., S.S., L.A.,
4-6	44.	design a dramatic production to illustrate the critical dependence of plants and animals upon water as a resource.	Sc., L.A., A.

4-6	45.	site specific examples illustrating how lack of good water management and conservation practices have made land practically useless.	S.S.
4-6	46.	identify and map a local watershed.	Sc., S.S.
4-6	47.	identify community practices that will improve water quality downstream.	Sc., S.S., H.
4-6	48.	illustrate, using specific data, how the cost of cleaning up water supplies will increase with each days delay.	S.S., H., M.
4-6	49.	defend or oppose the statement: "Environmental legislation must be enacted and enforced to keep the oceans from becoming more contaminated."	Sc., S.S., H., L.A.
4-6	50.	predict what will eventually happen to our water resources since the oceans are the final dumping grounds for all pollutants.	
4-6	51.	collect data on the percentage of the world's oxygen supply provided by the oceans and identify the key organisms in this cycle.	Sc., H.
4-6	52.	collect data, photographic records etc. which provide evidence of the sources of air pollution.	Sc., H.
4-6	53.	give examples of naturally occurring air pollution.	Sc., H.
4-6	54.	collect evidence of air pollution causing deterioration of cement, etc.	Sc., H.

4-6	55.	explain two ways air is a reusable resource which is cleansed by nature and by man to a limited degree.	Sc., H.
4-6	56.	propose an experiment which demonstrates air is an essential natural resource.	Sc., H.
4-6	57.	judge whether or not man's attempts to control air pollution by enforcing laws and exacting legislation have been adequate.	S.S., H.
4-6	58.	volunteer to research how man, plants and machines use air and report this to class.	L.A., H.
4-6	59.	describe how the heat and light of the sun, after being stopped by a blanket of earth's pollutants, affects his life and present his views in a report.	L.A., H., Sc.
4-6	60.	describe the personal and financial committments a person must make in order to have clean air to breathe.	S.S., H.
4-6	61.	design an A-V presentation which depicts air pollution as a serious problem and as "everyone's" responsibility.	Sc., S.S., L.A., H.
4-6	62.	explain why forests and timber are renewable resources.	Sc., S.S.
4-6	63.	identify and explain important functions of a plant or tree.	Sc.
4-6	64.	describe or demonstrate in his local area how plants and trees control soil erosion.	Sc., S.S.

4-6	65.	collect and report data which demonstrates the results of over-grazing, insects, forest fires and improper management in forests.	Sc., S.S., L.A.
4-6	66.	write a paper which compares short-term gains and long-range effects of various management programs.	Sc., S.S., L.A.
4-6	67.	suggest options open to society which will assure a future supply of forest products (i.e., recycling paper, optional building materials, optional resources for cellulose, tree farming, etc.)	Sc., S.S.
4-6	68.	describe in a report the role of the U.S. Forest Service state government industry or individuals in managing forests.	S.S., Sc., L.A.
4-6	69.	explain how wise use and proper management protects forests for future use.	S.S., Sc.
4-6	70.	suggest ways of increasing the recreational values of a forest.	S.S., H., Sc.
4-6	71.	defend or oppose the proposition that wildlife is a usable resource.	S.S.
4-6	72.	debate the resolution: Man can survive even after most forms of wildlife are destroyed; i.e., Bald Eagles become extinct. Who cares about the alligator?	S.S., L.A., H.

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4-6	73.	infer the future of man if all his resource management is no better than his present wildlife management.	Sc., S.S., H.
4-6	74.	give examples of how man's tampering with wildlife habitats has caused many species to become endangered or extinct.	S.S., Sc., M.
4-6	75.	discuss the need for legislation.	Sc., S.S., H.
4-6	76.	compare and contrast two communities by listing the good and bad natural resource usage in each.	L.A., S.S., H.
4-6	77.	illustrate the concept, "land is a natural resource of limited boundaries."	S.S.
4-6	78.	trace three products back to their origin to illustrate man's total dependence on soil.	S.S., Sc.
4-6	79.	write a story as drama to depict the changes that would occur in a community following the damming of a stream flowing through it.	S.S., Sc., H., L.A.
4-6	80.	give examples of how irrigation has brought unproductive land into useful production.	Sc., S.S.
4-6	81.	map location of essential minerals reserves throughout the world and discuss problems which might arise as they become depleted.	S.S., L.A.
4-6	82.	construct a chart or graph showing how advances in technology will increase mineral use.	S.S., Sc., M.

4-6	83.	Construct charts and graphs which compare the use of minerals and fuels for the year 1900 until the present.	Sc., S.S.
4-6	84.	describe ways man has improved or destroyed his environment.	S.S., L.A.
7-9	85.	compute the land area of the world in square miles and acres.	S.S., M.
7-9	86.	calculate the area of the earth which is compatible to man's survival.	S.S., M., Sc.
7-9	87.	calculate the amount of corn that could be grown on acres covered by highways.	S.S., V.A., M.
7-9	88.	explain the economic and ecological advantages in growing, harvesting and using ar organic garden.	Sc., V.A.
7-9	89.	discuss the implications of the data provided by charts and graphs which compare the use of minerals and fuels for the year 1900 until the present.	S.S.
7-9	90.	debate the resolution: The coal industry has an obligation to reclaim the earth's surface it disturbs.	S.S., Sc., L.A.
7-9	91.	collect information about the changes of wildlife distribution in his community during the past ten to twenty years and develop a public presentation on the topic.	L.A., V.A., Sc.
7-9	92.	write a theme about wildlife habitat problems.	V.A., L.A., Sc.

7-9	93.	plan and implement projects to attract acceptable forms of wildlife to the school grounds.	V.A., Sc., L.A.
7-9	94.	design and utilize methods for observing and recording wildlife habits without disturbing its activities.	V.A., Sc.
7-9	95.	prepare a wildlife improvement plan community which has a potential of being implemented.	V.A., Sc., S.S.
7-9	96.	discuss the need for preserving natural areas and related legislative needs.	Sc., S.S.
7-9	97.	debate the resolution: Resolved man does not need the Great Blue Heron, Timber Wolf, Kilier Whale, or other wildlife; therefore, he need not conern himself with their preservation.	L.A., S.S., Sc., H.
7-9	98.	analyze the affects that pets can have on the environment and the quality of life in an urban area and debate the advisability of pet ownership by city dwellers.	S.S., Sc., H., L.A.
7-9	99.	prepare a world wildlife summary and present findings to the class or other groups.	Sc., S.S., L.A., M.
7-9	100.	estimate the number of years before adequate wildlife habitat, watersheds, recreation areas or good farm land will disappear due to road, industrial & housing construction.	S.S., Sc., M.

7-9	101.	discuss the use of hunting seasons to manage wildlife, using examples such as deer, rabbit, raccoon, squirrel ducks, geese, etc.	S.S., Sc.
7-9	102.	gather data and prepare a presentation on endangered species.	S.S., Sc., L.A.
7-9	103.	take a stand on "clearcutting" forests and provide evidence to convince classmates and/or citizens of his position.	S.S., Sc.
7-9	104.	construct maps which identify areas of the earth having an annual rainfall of less than ten inches and having an annual temperature of less than 50 degrees F.	S.S., Sc.
7-9	105.	illustrate the hydrologic cycle and how man has affected it.	Sc., S.S.
7-9	106.	demonstrate and project in a formal speech ways life patterns are formed by the distribution of water supply.	L.A., S.S., H.
7-9	107.	identify ways, both public and private, for reducing consumption of potable water.	S.S., H., Sc.
7-9	108.	list examples of water misuse in his school. (Remember electricity comes from energy made by water.)	S.S., H.
7-9	109.	list soil and water use practices which affect the rate of river bank erosion.	V.A., S.S., Sc.
7-9	110.	calculate the amount of water required to produce various products, both manufactured and natural, including food.	V.A., M., Sc.

7-9	111.	evaluate the effects of various forms of water pollution on man's environment in different periods of history after readings such as Longfellow's Evangeline, Parts II and III, and Heyerdahl's Ra Expedition, etc.	L.A., Sc., S.S.
7-9	112.	debate whether or not water pollution is a serious problem in his community.	L.A., Sc., H.
7-9	113.	relate, in a creative writing, what will happen when there is no longer a supply of clean water.	L.A., S.S., H., Sc.
7-9	114.	select a newspaper article, poem, story or original writing which emphasizes man's or animal's needs for pure water.	L.A.
7-9	115.	explain why the bottled water business is becoming a profitable enterprise in California.	Ec., S.S., H.
7-9	116.	explain how water pollution by industrial chemicals in other states and nations affects life in Indiana.	S.S., H., Sc.
7-9	117.	predict the future of life if man continues excessive use of pesticides, insecticides, poisonous chemicals, oil, untreated sewage, fertilizers, etc.	S.S., Sc., H.
7-9	118.	identify possible water sources which may be used if local rivers, reservoirs and lakes are depleted or polluted and discuss the feasibility of using each source.	S.S., H., Sc.
7-9	119.	write a short essay about air quality in his community.	L.A., Sc.

7-9	120.	distinguish fact from opinion expressed in newspaper articles and other media about air quality.	L.A., Sc.
7-9	121.	prepare a speech on the need for clean air.	L.A., H., Sc.
7-9	122.	identify forms of air pollution in the 19th and 20th centuries through an informative article written to summarize these forms. (Read Dickens: A Christmas Carol, "Marley's Ghost.")	L.A., Sc.
7-9	123.	collect and analyze data on the history of air quality near population centers and relate findings to major changes in life styles such as the industrial revolution.	S.S., Sc., M., H.
7-9	124.	evaluate Indiana's efforts to to curtail air pollution.	S.S., H.
7-9	125.	construct charts showing the amount of gasoline, paper, meat, milk, bottles, cans, automobiles, water or clothing used by Americans in a year.	S.S., Ec., M.
7-9	126.	compare the environmental impact of a native American to the impact of a modern American.	H., Ec., V.A., S.S.
7-9	127.	analyze common life styles in terms of basic needs and human convenience.	L.A., S.S.

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7-9	128.	analyze the present styles of living in terms of the Earth's limited resources.	S.S., H.
7-9	129.	evaluate advertising in terms of its potential environmental impact.	L.A., H., Ec., Sc., S.S.
7-9	130.	project the earth's resource depletion rate if all people consumed natural resources at the rate Americans do.	S.S., H., Ec., Sc.
7-9	131.	develop a presentation describing the action Americans must take to insure adequate resources for future generations.	S.S., Sc., L.A.
7-9	132.	identify four individuals who have worked diligently to improve the environment and express his appreciation of their efforts by writing or visiting them.	S.S., L.A.
7-9	133.	identify several organizations responsible for improving the environment and explain the role each is playing in solving environmental problems.	V.A., S.S.
7-9	134.	draw a diagram showing how smog develops in a major metropolitan area such as Gary or Indianapolis.	S.S., Sc., A., H.
10-12	135.	collect and evaluate data on local, state, national and world supply and projected demand of two or more nonrenewable resources and predict the zero supply date for each.	Sc., M., Ec.

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10-12	136.	propose and evaluate (where possible) methods for delaying the zero supply date of a non-renewable resources and analyze the effects his proposals will have on the environment and life styles.	Sc., S.S.
10-12	137.	select a plan to delay zero supply dates and design a program to communicate the need for action.	Sc., L.A., S.S.
10-12	138.	analyze the environmental impact of utilizing one or more natural or man-made substitutes for a non-renewable resource, considering supply, energy needed to secure and process it, and its potential as a pollutant.	Sc.
10-12	139.	secure and evaluate data on the local, state, national, and or world supply or renewable resources, their current depletion rate, in terms of both quantity and quality, and the demands of society on the products of these resources and determine the various mechanisms that affect the depletion of one or more of these resources.	Sc., S.S., Ec.,
10-12	140.	propose and evaluate (when possible) methods for arresting and, if possible, reversing the depletion rate of a renewable resource to provide an optimal steady state supply of the resource and analyze the effects of his proposals on the environment and life styles.	Sc., S.S., M., Ec.

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10-12	141.	design a program for communicating the need for action to arrest and reverse the depletion rate of a renewable earth resource.	Sc., L.A., S.S.
10-12	142.	define the role which science and technology can and should play in developing and implementing solutions to an earth resource problem.	Sc., Ec., S.S.
10-12	143.	name five ways Indiana rivers are being misused and propose a plan which would alleviate each problem.	S.S., H., Sc.
10-12	144.	locate areas on an Indiana map having primary, secondary and tertiary sewage treatment plants.	S.S., H., Sc.
10-12	145.	defend or oppose a plan to construct a man-made canal through Indiana to connect the Great Lakes with the Ohio River.	Ec., S.S., H.
10-12	146.	predict the future of game fish in Lake Michigan.	Sc., H.
10-12	147.	construct a world map showing major water pollution centers (rivers, lakes, oceans) and sources and discuss their probable permanence.	S.S., H., Sc.
10-12	148.	determine and compare per-capita consumption of various societies.	S.S., H.

10-12	149.	conduct research to determine far reaching effects of pollutants dumped into nearby streams and lakes and report this information to class and community.	S.S., H., Sc.
10-12	150.	conduct research projects to evaluate the conditions of oceans and predict problems arising from nations using the ocean as "dumping grounds" for waste products.	H., S.S., Sc.
10-12	151.	present his views concerning the economic and ecological implications of using algae from the ocean as food supplement.	H., Ec., Sc.,
10-12	152.	research and report the economic and ecological feasability of using desalted ocean water for purposes of irrigation and human consumption.	Sc., Ec., S.S., H.
10-12	153.	determine the percentage of naturally recycled oxygen resulting from the oceans, identify the organisms involved, describe the effect of pollution on these organisms and propose a model regulatory system for coping with these problems.	Sc., S.S., H.
10-12	154.	debate the resolution: Water pollution is a world problem.	L.A., Sc., S.S., H.
10-12	155.	prepare and present a written script for a "talk" show dealing with the need for pure water and clean air.	L.A., Sc., S.S., H.
10-12	156.	design and/or participate in a school site management.	V.A., Sc., A.

10-12	157.	develop a farm land use and management model that will maximize this land's potential service to present and future generations.	V.A., S.S., Sc.
10-12	158.	identify and explain problems resulting from intensified food production.	V.A., H., Sc.
10-12	159.	write a review of Steinbeck's Grapes of Wrath which identifies the effect of man's manipulation of the land.	L.A., S.S., Sc.,
10-12	160.	discuss the effects of poor water wildlife management using as examples the brown pelican, sword fish, killer whate, etc.	S.S., Sc.
10-12	161.	prepare a report on annual activities dealing with wildlife management which he and the school could participate in.	L.A., Sc.
10-12	162.	investigate and report on possible environmental careers.	Sc., H., S.S.,
10-12	163.	become actively involved in a civic environmental problem that is immediate and relevant and make periodic (vital) reports on progress to the class.	L.A., S.S.
10-12	164.	write an article which describes and analyzes impact the news media has on public views of environmental problems.	L.A., S.S.
10-12	165.	debate the resolution: The United States cannot afford to build smaller cars, produce less clothing, construct fewer highways, etc.	Ec., S.S., L.A., H.

Global

Objective C: The student will voluntarily become purposefully involved in activities regarding waste disposal problems.

Suggested Grade Level		Instructional Objectives: Provided with the necessary activities, experiences, data and information the student will:	Suggested Curriculum Areas
K-3	1.	identify and give examples of items which should be used more than once.	S.S., Sc.
K-3	2.	identify areas in his local community where wastes are treated, handled, or dumped.	S.S., Sc.
K-3	3.	compare space taken by two cans when one is flattened and one is not; give oral report on observation.	Sc., L.A.
K-3	4.	propose a better use for used cans than throwing them in the garbage can. (Recycle)	Sc., S.S.
K-3	5.	tell how his family disposes of wastes.	Sc., H., S.S.
K-3	6.	collect all the litter found on the school grounds in a day and infer the amount of litter produced per student in the school.	M., Sc.
K-3	7.	organize a program to encourage others to help keep the school grounds un-littered.	Sc., A., L.A., S.S., H.

K-3	8.	plan and participate in collection campaigns which will help in the disposal or recycling of waste materials.	Sc., S.S.
K-3	9.	make a graph and put checks behind their name as to how many pieces of litter picked up. Give a short oral report on the effect of their own private clean-up campaign.	M., L.A., Sc.
K-3	10.	classify litter that they have collected around the school or in the neighborhood into various groups: natural or man-made; designed as a container or non-container; plastic or non-plastic; etc.	Sc.
4-6	11.	identify items he uses which may be recycled.	Sc., S.S.
4-6	12.	identify some specific nearby locations in his community where recyclable materials may be taken for processing.	Sc., S.S.
4-6	13.	suggest possible methods of solid waste disposal for his community which would be both practical and suitable for maintaining a high quality of life.	Sc., S.S., H.
4-6	14.	design a policy for solid waste disposal which would be practical and enforceable.	Sc., S.S., H.
4-6	15.	prepare a tape, slide or picture presentation about the amount of solid waste produced in the school or community.	L.A., A.
4-6	16.	defend the need to recycle paper, metals, plastics, etc., basing his reasoning on data regarding the depletion of that particular resource or raw material.	S.S., Sc.

4-6	17.	ask five families if they would be willing to recycle their solid wastes and report findings of survey to class.	L.A., S.S.
4-6	18	identify materials he uses daily and trace them to minerals used in making the product.	S.S., Sc.
4-6	19.	identify three ways man can reduce the impact on mineral resources and suggest specific steps to implement these changes.	S.S., Sc.
4-6	20.	predict the future of mineral resources if man's demands are continued at the present rate.	S.S., Sc.
4-6	21.	select and elaborate on three ecological ways of mining and recycling which he feels can conserve mineral resources and quality of the environment.	S.S., Sc.
4-6	22.	analyze why safe and proper disposal of waste products is essential to the preservation of the environment.	Sc., S.S., H.
4-6	23.	predict the effects of paper recycling programs on forests.	S.S., Sc.
4-6	24.	prepare and give a campaign speech citing his solutions to pollution problems.	L.A., H., S.S.
7-9	25.	give three examples of how man wastes minerals in his daily living habits and propose a better use plan for each.	S.S., Sc.
7-9	26.	predict the effects of wasting minerals in terms of future costs and availability.	S.S., M.
7-9	27.	identify the variables which have accelerated the depletion of some of our mineral resources.	S.S., Sc.

7-9	28.	calculate the tons of solid waste produced in the United States in a year.	S.S., M.
7-9	29.	project on a graph the future reserves of ten important minerals if mass recycling does not become a reality.	S.S., M.
7-9	30.	debate the resolution: Each American family should be restricted to one car.	S.S., Ec., Sc., L.A.
7-9	31.	debate the resolution: The school should not allow non-returnable bottles and aluminum cans to be used in the building.	S.S., Sc., L. A.
7-9	32.	survey his school to see how many teachers and other staff members would walk, ride a bicycle, ride a bus or share a car pool.	S.S., L.A., Sc.
7-9	33.	Participate in a committee to plan and publicize a recycling project using posters, speeches and letters to encourage collection of cans and bottles.	L.A., A., S.S., Sc.
7-9	34.	identify materials which can be recycled and propose a plan to accomplish maximum recycling in his community.	S.S., Sc.
7-9	35.	list practices in his home which waste resources and propose better practices.	S.S., Sc.

7-9	36.	defend or oppose the waste management practices of his family.	S.S., Sc.
7-9	37.	develop a waste management plan for his lawn, garbage, paper containers, electrical consumption, heating and air conditioning, transportation, cleaning, clothing and other items.	S.S., Sc., H., H.Ec.
7-9	38.	evaluate existing recycling programs in his community.	S.S., Sc., H.
7-9	39.	analyze the affect of various waste disposal systems on the environment and state the conditions which would make each system advisable.	Sc., H., S.S.
7-9	40.	debate the resolution: Business and industry is currently fulfilling its responsibility in the management of solid waste.	S.S., L.A., Sc., H.
7-9	41.	write an essay on the topic: Americans have become users instead of consumers.	E., S.S., Sc., L.A.
7-9	42.	discuss the adequacy of existing solid waste laws.	S.S., Sc.
7-9	43.	develop a state solid waste management model.	S.S., Sc.
7-9	44.	determine the adequacy of federal and state budgeting for the solution of solid waste problems.	S.S., Sc.
7-9	45.	discuss the relation between a nations waste burden and its level of civilization.	S.S., L.A.

10-12	46.	compile enough information to classify human, industrial and business wastes into one or more of the following categories: returnable and reusable in form, a reclaimable by-product, recyclable by natural processes, easily recyclable by technology (i. e., would require small energy input), recyclable with great energy consumption, or practically non-recyclable.	Sc., S.S.
10-12	47.	use his list to propose viable programs for minimizing the accumulation of man-generated wastes in the air, water and soil and analyze the effects of such programs on life styles including his own.	Sc., S.S.
10-12	48.	design a program to effectively communicate the need and feasibility of recommended action of an acceptable waste management program.	L.A., S.S., Sc., H.
10-12	48.	classify non-recyclable and expensively recyclable wastes as essential by-products of human life or by-products of human convenience.	Sc., S.S.
10-12	50.	assess the environmental impact of the accumulation of wastes not easily recyclable, but essential by-products of human life, on the continuing evolutionary processes of the earth and propose optimal methods for the disposing of these wastes.	S.S., Sc., H.
10-12	51.	collect the needed information on two or more current or proposed methods of waste disposal and compare their potential environmental impact in terms of harboring pests and disease and/or poisoning various life forms.	Sc., S.S., H.

10-12	52.	illustrate how changing "life styles" may prevent a world catastrophe.	S.S., E., Sc., L.A.
10-12	53.	defend or oppose these ideas. 1) "Laws have to be passed which force industries to plan for the reuse of materials in cars, refrigerators, stoves, etc." 2) "Offering money to "users" for cans, bottles and paper returned will help solve the problems of solid waste and recycling." 3) "Cities having difficulty disposing of solid wastes should ship their trash to abandoned mines where it will be "stockpiled" for future use." 4) "Other cities need to follow New York City's plan which involves dumping its solid waste into the ocean." 5) "Japan has solved its solid waste problem by developing building bricks out of the trash which is then used to build factories, businesses, etc." 6) "Giant mulchers can solve the solid waste problem by chewing everything to shreds which can then be piped to the country to be used as fertilizer." 7) "Don't use paper plates, paper cups, paper towels, paper nankins." 8) "Communities need to organize recycling programs to adequately solve the solid waste problem."	S.S., H., H.Ec., L.A., Sc.

9) "Begin campaigns in your community to do away with non-returnable bottles."
10) "Talk with your grocer and ask him to "relay the word" back to his suppliers that you want packaging simplified and reduced."
11) "Don't buy milk in paper containers."
12) "Tell your supermarket operator that you want his suppliers to initiate can recycling campaigns to get millions of tons of metals back for re-processing."
13) "Reuse paper bags; don't overpackage your lunch with paper and plastic around every sandwich."
14) "Carry a litterbag and use it."
15) "Write the brewers and bottlers asking that they join together in a national effort to recycle the millions of tons of metals that are now totally wasted."
16) "Write to such firms as the big food chains, aluminum producers, and the big steel makers asking them to cooperate in recovering and reprocessing methods."

10-12	54.	document the extent of open dumping in his community and discuss its impact on community pride.	S.S., L.A., Sc.
10-12	55.	collect data on ocean dumping and its potential hazard to the human species.	S.S., Sc., H.
10-12	56.	review current legislation for his state or community which relates to solid waste disposal and identify their strengths and inadequacies.	H., S.S., Sc.

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10-12	57.	plan a recycling project for his community of as many items as he determines to be practical.	S.S., H., L.A., Sc.
10-12	58.	plan an organic gardening project for his home, school, or community which demonstrates the value of recycling organic wastes.	S.S., V.A., H.Ec.
10-12	59.	construct a model of a typical septic system, describe the function of each part and/or discuss its adequacy as a treatment system.	H., Sc.
10-12	60.	investigate the possibility of installing a "Lagoon System" in his community and report his findings to the school and community.	H., Sc., S.S., L.A.
10-12	61.	calculate the cost per family of various types of sewage treatment systems and compare their effectiveness.	H., M., Sc.
10-12	62.	demonstrate the affect of thermal pollution on algae growth and its effect on other life in the water.	H., Sc.
10-12	63.	develop techniques for determining public and private discharges of pollution into streams and waterways.	H., Sc.
10-12	64.	identify polluters of water in his area and describe steps that he, as a private citizen, can take in an attempt to correct each problem.	H., S.S., Sc.
	65.	identify diseases which may result from the drinking of polluted water.	H., Sc.
10-12	66.	develop a workable plan for recycling water which would be appropriate for his particular community.	H., Sc., S.
10-12	67.	identify the major polluted lakes and rivers in the midwest and list the major sources of pollutants entering those bodies of water.	H., S.,

Global Objective D: The student will demonstrate his awareness of population problems by rationally defending a position on population management.

Suggested Grade Level		Instructional Objectives: Provided with the necessary activities, experiences, data and information the student will:	Suggested Curriculum Areas
K-3	1.	explain his feelings about over crowded conditions when two classes volunteer to share one classroon.	S.S., Sc.
K-3	2.	list places he can play and compare this with places he would like to play.	S.S.
K-3	3.	make observations of a closed ecosystem, such as a terrarium or aquarium, and record by pictures or the changes in population which occur throughout the year.	Sc., A.
K-3	4.	observe and record changes in the outdoor populations which occur as the seasons change.	Sc., M.
K-3	5.	compare the number of people who live in a single building in the city with those in the country.	S.S., M.
K-3	6.	compare the freedom city dwellers have to people who live in the country.	S.S.
K-3	7.	compare the size of his family with others in his classroom.	S.S., M.

4-6	8.	compare available space per person today with the year 1900.	S.S., Sc., M.
4-6	9.	compare the ease with which various human wants and needs can be met in urban and rural environments.	S.S., H., Sc., L.A.
4-6	10.	list some effects that food, disease, birth rate, and land use have upon life expectancy.	S.S., H., Sc.
4-6	11.	compare the roads of long ago with the modern day roads showing a change in use due to population growth.	S.S., L.A.
4-6	12.	construct a food web for an eco-community he has observed.	Sc., S.S.
4-6	13.	establish a balanced aquarium either at school or at home.	Sc., S.S.
4-6	14.	list population variables which if manipulated would have an effect on the aquarium environment.	Sc.
4-6	15.	suggest changes which would occur in the aquarium for each of the variables listed above.	Sc.
4-6	16.	test the affect of each variable on the aquarium environment and record observable changes.	Sc.
4-6	17.	write a short paper relating the changes that occurred in the acquarium to their causes.	Sc., L.A.
4-6	18.	choose something that has changed since man came to Indiana and offer reasons why an increased population has made life better or worse.	S.S., L.A.

4-6	19.	illustrate clearly, through pantomine, a leisure time activity can become a bad experience as a result of over population. (camping, hiking, sports, nature study, etc.)	S.S., L.A., H.
4-6	20.	illustrate how either plants, animals or humans can over populate a given area thus reducing the quality of life of each individual.	S.S., L.A., H., Sc.
4-6	21.	demonstrate that oxygen is a necessity for life in water and explain why there is a limit to the number of fish per square foot of water.	L.A., H., Sc.
4-6	22.	debate the issue: Deer hunting is necessary to maintain a balance in wildlife areas.	S.S., L.A.,
4-6	23.	list ways the classroon becomes too crowded and uncomfortable for good learning (poor air, noise, nearness, no room for walking, etc.) and prepare a plan to overcome such problems.	S.S., L.A., H.
4-6	24.	construct a community model which demonstrates an ecological balance among plants, animals, people, etc.	S.S., Sc., A.
7-9	25.	write a short story which is either factual or ficticious showing environmental changes resulting from overpopulation.	S.S., L.A., Sc.
7-9	26.	defend assumptions used in a paper written on the effects of overpopulation.	S.S., L.A., H., Sc.

7-9	27.	discuss why population growth and man's trememdous use and misuse of energy and resources are primarily responsible for today's more serious environmental problems.	S.S., H., Sc.
7-9	28.	gather, interpret, and compute data which demonstrates how population grows geometrically but food production grows arithmetically.	S.S., M., Sc.
7-9	29.	write and present a 2-3 minute speech which explains why the population explosion and man's unrestricted use of resources poses a threat to all natural resources.	L.A., H., Sc.
7-9	30.	discuss the relationship of population increases to problems of disease.	S.S., H., Sc., L.A.
7-9	31.	justify social controls on population growth based on identifiable stresses now being made and which will be made on public services, resources, and space.	S.S., H., Sc.
7-9	32.	use rational argument to defend, oppose, or remain neutral concerning the topic, "Resolved that population controls should be set by government".	S.S., H., Sc., L.A.
7-9	33.	debate the proposition: The government should compensate women for each five years they remain childless between ages 14-49.	S.S., L.A., Ec.
7-9	34.	predict the changes that would take place in his family life if his mother gave birth to triplets.	S.S., H.

7-9	35.	list and describe four projects he feels American cities should practice to overcome crowding problems.	S.S., H., Sc.
7-9	36.	compare the merits of high rise apartments with those single family dwellings in terms of quality of life and environmental impact.	S.S., H., Sc.
7-9	37.	discuss the psychological and physical effects resulting from overcrowding, noise, poor housing, inadequate diet, lack of recreational facilities, and loss of contact with nature in large cities and identify what he can do to solve some of these problems.	S.S., H., Sc., Psy., Ec.
7-9	38.	demonstrate, using written or oral communication, how population size affects the accuracy of information transfer.	S.S., L.A.
7-9	39.	infer from graphed data on world population growth for the past twenty centuries social and economic problems which may be a result thereof.	S.S., H., M., Ec., Sc.
7-9	40.	compute the change in population concentrations per square mile for his area during the past 50 years and discuss the implications if these trends continue.	S.S., M., Sc.
7-9	41.	construct a graph which will represent the population change of the earth for the beginning of each century, zero A.D. to the present.	S.S., Sc., H.

7-9	42.	extrapolate from current world population growth data the expected world populations for the year 2000 and 2500 and use this information to predict the future needs of his area.	S.S., H., M. Sc.
7-9	43.	prepare a report which evaluates present farming methods and projects changes necessary to meet the needs of various world populations.	S.S., V.A., I L.A.
7-9	44.	defend land use planning in terms of meeting future needs for all aspects of human existence.	S.S., Sc.
7-9	45.	role play different national leaders solving predicted food problems.	S.S., V.A., I Sc., L.A.
7-9	46.	calculate the acres removed from food production by urbanization.	S.S., V.A., M
7-9	47.	use data from the World Population Data to compare population growth rates of underdeveloped, developing and developed countries. (See the data on pages 60-63 of PEOPLE--available from Columbia Books, 425 Southern Building, N.W; Wash., D.C. 20005. $1.50)	S.S., M.
7-9	48.	list and discuss societal, cultural and family values which may account for differences observed above.	V.A., S.S., L Ec.
7-9	49.	analyze pressures upon government agencies in each of the national categories above when attempts are made to manage population growth.	S.S., L.A., E

7-9	50.	predict future action countries may have to take to feed, clothe and house their people.	S.S., V.A., Sc.
7-9	51.	predict the affects a 2% world increase in population growth will have on resources and ecosystems.	S.S., H., Sc.
7-9	52.	analyze the affect of increasing population on wildlife.	S.S., Sc.
7-9	53.	project and demonstrate through creative writing four changes which will occur in the balance of nature if America's population is doubled.	L.A., Sc.
7-9	54.	debate the topic: "Resolved that man's population growth is busy making the most elegant solutions to any other environmental problem utterly futile".	S.S., H., Sc., L.A.
7-9	55.	discuss the feasibility of solving the earth's population problems by space migration.	S.S., H., Sc.
7-9	56.	indicate how his experiences in the study of population has affected his attitudes.	S.S., Psy., L.A.
10-12	57.	debate the following statements: 1. "With strigent controls and massive amounts of money air and water can be kept clean even with a double in population growth" 2. "Population and pollution problems will be solved only by having countries work together rather than fighting each other."	S.S., H., Sc., Psy., Ec., L.A.

3. "States must stop subsidizing welfare recipients having more children and place restriction on the number of children they can have."
4. "ZPG must take priority over GNP during the next 20 years."
5. "Money spent on war and space exploration could be better spent on solving population and pollution problems on this plant."
6. "The federal, state and local governments must evaluate present priorities and make sure population control, pollution, housing, land use and other environmental problems take precedent over priorities which only exploit this planet's resources."
7. "Food and other natural resources in the oceans have already been harvested, exploited and polluted to such an extent that they offer little hope for feeding and supplying resources for increased populations."
8. "People, homes, schools, cars, factories and business moving to a small town means progress, cheaper taxes, better sewage treatment and pollution for that town."
9. "There is nothing towns and cities can do to stop progress."
10. "To ask one race and religion to accent ZPG and allow other races and religions to continue overpopulation is unfair."

11. "If the mentally retarded, emotionally disturbed and people on welfare are allowed to have as many children as they wish and, at the same time, the average and above average are restricting their population to two per family, this could eventually lead to a country having a population which is mostly illiterate and uneducable.
12. "Social values must be changed so that sterilization, abortions, and other successful child preventing practices are developed, accepted and practiced by the majority."
13. "Families having more than two children should not be allowed deductions on their income tax."
14. "The advancement of medical science has been a blessing to the world."
15. "Advances in farming will provide enough food to take care of the world's population growth."
16. "Future population problems will be solved by having people live in oceans, high rise apartments and/or other planets."
17. "The population explosion is not responsible for environmental pollution."
18. "Overpopulation leads to revolutionary activity and political unrest."

10-12	58.	debate the following proposals: 1. "Families must limit themselves to two children." 2. "Federal government should insist on population control measures as a prerequisite for food aid to foreign countries." 3. "Research must be funded to develop new birth control measures."	S.S., H., Sc., L.A.

		3. "Research must be funded to develop new birth control measures." 4. "The United Nations must develop programs to meet the world challenge of a rapid population growth." 5. "Family planning centers should be developed in all communities."	
10-12	59.	investigate population growth in his own community by collecting and computing birth and death rate data.	S.S., M.
10-12	60.	participate in a mock trial in which one or more students are accused of violating Zero Population Growth requirements in the year 1984.	L.A., S.S.
10-12	61.	debate the position: "Controlled birth and death is the only way to control population."	S.S., H., L.A.
10-12	62.	predict, based on population for the years 1850 to 1972, when this planet will likely have more people than its resources can feed, clothe and shelter.	S.S., H., M., Sc.,
10-12	63.	develop and defend a position concerning the need to regulate population after securing and evaluating data (both historical and current) on the impact of population concentration on life styles and data on the population trends of his community, county, state, nation and/or world.	Sc., S.S.

10-12	64.	evaluate various mechanisms for population control in terms of effectiveness, usability and moral acceptability.	Sc., S.S.
10-12	65.	discuss the impact of a forced ZPG on his life style.	H., S.S., L.A., Ec.
10-12	66.	calculate how long it will take to establish ZPG and what the population will be if a program to limit women to two children is immediately implemented.	Sc., M.
10-12	67.	project the effect that an increasing worldwide life expectancy of 10 years would have on a stablized population level if population control mechanisms were to remain static.	M., Sc.
10-12	68.	identify at least six environmental problems related to over population and explain how these problems relate to population growth.	S.S., H., Sc., L.A.
10-12	69.	write a short story or drama about the confrontations that would take place on a long term spaceship voyage if couples aboard did not adhere to ZPG policies and relate these projected confrontations to the future of Spaceship Earth.	L.A., Sc., S.S., H.
10-12	70.	assume a world population of 7 billion in the year 2000 and write a short story depicting the affect of this population on the quality of life.	S.S., L.A., H.

10-12	71.	extrapolate population and food production data to the point where the demand for food in this country will equal the supply.	S.S., V.A., Sc.
10-12	72.	compare population growth data with that of potential world food production capabilities.	S.S., V.A., Sc.
10-12	73.	suggest reasons why the rate of population growth in India remained unchanged even though 1.6 million men submitted to sterilization in a single year.	S.S., H., M.
10-12	74.	identify and explain new problems India may have by 1980.	S.S., V.A., H., Sc.
10-12	75.	prepare a written report on the problems caused by population explosion in other mid-east countries.	S.S., H., Sc., Psy., L.A.
10-12	76.	list and explain ways in the United States population affects the resources of other countries.	S.S., H., Sc., Ec.
10-12	77.	write a theme showing how individual acts, duplicated or compounded, produce significant environmental alterations over time.	L.A., Sc.
10-12	78.	evaluate the possibility of mass migration to another planet to ease the Earth's load by calculating the energy requirements for such migrations based on two or more rates of population growth.	M., Sc.
10-12	79.	investigate the family planning being considered by five young married couples in his community. (Explain present planning adequacies and inadequacies.)	S.S., H.

Global Objective E: The student will demonstrate an appreciation for the interdependence of living things in the closed earth system.

Suggested Grade Level		Instructional Objectives: Provided with the necessary activities, experiences, data and information the student will:	Suggested Curriculum Areas
K-3	1.	describe how people in his community are dependent upon other communities for food, clothing and shelter; e.g., grassland communities, ocean-side communities, forest communities, etc.	Sc., S.S., H.
K-3	2.	describe ways in which man's presence in his community has produced changes from its original natural state. (Construction of roads, bridges, houses, businesses, factories, etc.)	Sc., S.S., H.
K-3	3.	compare air and/or soil temperatures recorded at the same time for classrooms, playground, lawn, flower beds, wood lots and infer why these temperatures are not all the same.	Sc.
K-3	4.	correctly identify common plants found in his area that may be harmful to people such as poison ivy, poison oak, etc.	Sc.
K-3	5.	identify common plants found on the school playground and develop a key to classify and identify them.	Sc.
K-3	6.	learn to recognize some animals by name through pictures.	Sc., L.A.

K-3	7.	infer from a picture of a set of animal tracks what the animal was, where it came from and what it might have done.	Sc.
K-3	8.	give examples of simple predator-prey relationships.	Sc., S.S.
K-3	9.	suggest possible results of disruption in predatory-prey relationships.	Sc.
K-3	10.	write an informational article on the needs of an animal or bird of his choice.	L.A., Sc.
K-3	11.	give an imaginative talk telling what happened to him as a frog when he went out to dinner.	L.A., Sc.
K-3	12.	identify a number of birds or other small animals found in his area and describe their food and nesting requirements.	Sc.
K-3	13.	develop and execute a plan to improve bird and animal habitat such as building nesting boxes, establishing cover for rabbits, etc.	Sc., A.
K-3	14.	pretend to be a rabbit by explaining where he would look for food, shelter and protection from enemies.	L.A., Sc.
K-3	15.	infer the effects that burning weedy fields and fence rows have on the nesting grounds of birds and small mammals. (Pheasants, quail, rabbits meadow larks, etc.)	Sc.
K-3	16.	express in a creative play his feelings about man destroying the habitats of animals.	L.A., Sc.

K-3	17.	compare some food chains he has observed.	Sc., S.S.
K-3	18.	generate a story which would depict what life could be like if pigs and cows would become extinct.	L.A., S.S.
K-3	19.	carry out a study to determine how homeless cats and dogs may be a problem in the community.	Sc., S.S., H.
K-3	20.	identify some endangered species of animals and describe how man has caused this.	Sc., S.S., H.
K-3	21.	depict in a class play a family that is living in harmony with the environment.	L.A., S.S., Sc.
K-3	22.	identify the necessities for life on a spaceship by drawing or cutting pictures of the needed supplies.	Sc., L.A., S.S.
K-3	23.	identify poor ecological practices which exist locally.	S.S., H., Sc.
4-6	24.	list major categories man needs to support and maintain life.	Sc., S.S.
4-6	25.	record observations made about wildlife found in his neighborhood during each season of the year.	Sc., L.A.
4-6	26.	prepare a report which contains observations and conclusions formed as a result of the study.	Sc., L.A.
4-6	27.	construct a food chain of a given animal and describe the effect if this chain is broken.	Sc., L.A., S.S.

4-6	28.	name three wild animals commonly found in Indiana and list the major elements of a suitable habitat for each.	Sc., S.S.
4-6	29.	demonstrate two ways living things are independent.	Sc., S.S., H.
4-6	30.	predict the results of the removal or addition of a predator or prey to a balanced ecological system.	Sc., S.S.
4-6	31.	give examples of organisms which are harmful to man but are helpful in maintaining a balance between living things.	Sc., H., S.S.
4-6	32.	trace the journey of a particle of matter through living organisms from dust to dust.	Sc., S.S.
4-6	33.	construct a chart showing green plants as the focal point of man's supplies for food, clothing, shelter and energy	Sc., S.S., A.
4-6	34.	discuss why pesticides must often be used even though they may be detrimental to many species of life.	S.S., H., Sc.
4-6	35.	write an imaginative story of one day in the life of a plant or animal he has observed.	L.A., Sc.
4-6	36.	give examples of man preserving or destroying the earth.	Sc., H., S.S.
4-6	37.	give examples of how natural laws, which provide for an intricate and interrelated balance in nature, have been upset by man.	Sc., S.S.

4-6	38.	describe types of natural organic decomposition and identify ways that man's actions have disrupted the natural cycle.	Sc., S.S.
4-6	39.	construct food chains with man as the terminal consumer.	Sc., S.S.
4-6	40.	demonstrate how man is part of the ecosystem and must live within it.	Sc., S.S., H.
4-6	41.	support with data why the earth's resources, even with optimum recycling systems, can only support a limited population.	S.S., Sc., H.,
4-6	42.	discuss why man has and is changing from "use and move on" practices concerning support systems.	S.S., Sc., H.
4-6	43.	give examples of how survival of an organism depends on its ability to adjust to its environment and explain how man makes most of his adaptations through use of his intelligence.	Sc., S.S., H.
4-6	44.	defend his reasons for advocating certain social and/or governmental controls which tend to limit man's freedom to determine his own life style.	Sc., S.S.
4-6	45.	formulate a model to illustrate the finite nature of the earth system.	Sc., A., S.S., H.
7-9	46.	construct food webs which contain various specified animals such as: fox, hawk, mouse, salmon, shark, cow, owl, man.	Sc., S.S.

7-9	47.	develop and test a hypothesis about a reduced owl population in his county.	Sc., S.S.
7-9	48.	predict the consequences of tampering with an ecological system such as the removal of a coyote from a system.	Sc., S.S.
7-9	49.	collect evidence showing how the "balance of nature" has become upset with the removal of a species from an eco-community.	Sc., S.S.
7-9	50.	illustrate how the carrying capacity of an area is determined by certain ecological factors.	Sc., S.S.
7-9	51.	evaluate the truth of the position: The interdependence of animals and plants provides a balance between living things on Earth and does not allow over population.	Sc., S.S.
7-9	52.	diagram the interrelationships of animals and plants in his community and report how his daily activities affect this interdependency.	Sc., S.S., H.
7-9	53.	explain the complexities of an ecological problem within a given ecosystem.	Sc., S.S., H., L.A.
7-9	54.	identify an ecological problem in his community and organize a program to correct it.	S.S., Sc., H.
7-9	55.	present a formal speech illustrating how the school is a minature ecosystem within another ecosystem.	Sc., L.A.

7-9	56.	identify an example of overloading the carrying capacity of an area and develop a presentation portraying this misuse of the environment.	L.A., Sc., H. S.S.,
7-9	57.	formulate hypothesis about how environmental changes made by man may upset the ecological balance.	S.S., Sc., H.
7-9	58.	discuss how the manipulation of one environmental element affects all elements.	S.S., Sc., H.
7-9	59.	identify how the CO_2 - O_2 (carbon dioxide oxygen) cycle is affected by his family, industry, and citizens in the community and discuss what he and others must do to insure a functional CO_2 - O_2 cycle.	S.S., Sc., H.
7-9	60.	suggest ways to help guard against any improper environmental manipulations being committed within existing ecosystems.	Sc., H., L.A., S.S.
7-9	61.	propose several changes technology should make to reduce its adverse effects on ecosystems.	S.S., Sc., H.
7-9	62.	gather, interpret, and disseminate information concerning the effects of chemicals (pesticides, phosphates, etc.) on balanced ecosystems.	Sc., L.A., H.
7-9	63.	design an experiment to investigate the effect of detergent on fish.	Sc., H.
7-9	64.	collect data to illustrate the change in algae species that result from increased detergent use.	Sc., H., S.S.

7-9	65.	hypothesize about ecological problems resulting from the destruction of a marsh.	Sc., S.S., H.
7-9	66.	brainstorm and contribute to a list of ideas on the question: How can man live in harmony with nature in the 20th century?	L.A., S.S., Sc., H.
7-9	67.	search for words relating to environment and develop puzzles and other ecological word games to be solved by other students.	L.A., Sc., S.S., H.
7-9	68.	construct a model of a watershed which shows how living organisms interact with each other and their environment.	S.S., Sc., L.A., H.
7-9	69.	develop a satirical T.V. presentation highlighting the concept that an area can support only a limited number or organisms.	Sc., L.A., S.S., H.
7-9	70.	describe the steps involved in starting a compost pile and developing it and discussing the natural processes involved in this recycling.	Sc., V.A.
7-9	71.	describe the natural and ecological beauty of a pond and discuss life styles needed to preserve its delicate balance.	L.A., S.S., Sc.
7-9	72.	describe the natural and ecological beauty of a river and discuss life styles needed to preserve its ecological function.	L.A., S.S., Sc.
7-9	73.	construct an operational definition of a closed system after gathering data concerning the needs and limitations imposed on a spaceship crew during a trip to Mars.	Sc., H., S.S.

7-9	74.	write and produce a drama which depicts an extended voyage through space in a closed spaceship system.	L.A., Sc., S.S., H.
7-9	75.	describe plant-animal interdependence within a spaceship during a flight to a near star.	Sc. S.S., L.A., H.
10-12	76.	draw, or describe, a food chain which shows how animals collect DDT in their bodies by eating plants and other animals.	Sc., L.A., H.
10-12	77.	propose action to remove harmful insecticides and pesticides from the market and report on research being done to prevent future products from being marketed until adequate testing data proves them to be safe.	Sc., V.A., H. Ec., S.S.
10-12	78.	offer alternatives to the use of insecticides and DDT for insect control.	Sc., V.A.
10-12	79.	predict the future of man if he continues to pollute the environment with pesticides.	Sc., H.
10-12	80.	list ways in which all living things are dependent upon pure water.	Sc., H.
10-12	81.	explain the natural steps occurring in unpolluted water (lakes, rivers) to decompose sewage.	Sc., H.
10-12	82.	provide ecological reasons why varieties of fish once caught in Lake Erie are no longer there.	Sc., H., S.S.
10-12	83.	construct a chart showing the various stages that a pond or lake goes through in its life cycle.	Sc.

10-12	84.	describe one cause and effect relationship which occurs as a result of man's attempt to exterminate predators.	Sc., L.A.
10-12	85.	debate the validity of the premise: The history of man is the history of his growing mastery over nature.	Sc., L.A., S.S.
10-12	86.	discuss the hypothesis: The biosphere, as it occurs on earth, is a single macroorganism.	Sc.
10-12	87.	select an article from a popular periodical (or newspaper) dealing with environmental problems and analyze cause and effect relationships stated in it as to whether these relationships are observations, substantiated conclusions based on observations, supportable hypotheses or merely inferences of the author.	L.A., Sc., S.S.
10-12	88.	take a radio or television program dealing with the environment and analyze cause and effect relationships presented in it as to---(see above).	L.A., Sc., S.S.
10-12	89.	select an isolated biological community and analyze it in terms of identifying all possible ecological relationships between individual organisms and species within it.	Sc.
10-12	90.	analyze the above biological communities in terms of any natural ecological succession that is occurring with it.	Sc.

10-12	91.	further investigate the biological community above to identify any imports and exports (including animal migration) energy and matter occurring.	Sc.
10-12	92.	impose a hypothetical change upon the biological community above (such as a sudden change in the population or habits of one native species, of plant or animal temperature, rainfall, or introduction of foreign matter or species) and trace the ecological disturbances that would occur in the community.	Sc., S.S.
10-12	93.	use the model developed in the four objectives above to formulate a model for the closed earth system and analyze and project the impact of various human activities upon this system.	Sc., S.S., H.
10-12	94.	use various communicative techniques and art forms to present to others ecological problems he has investigated in five objectives above.	L.A., A., S.S., Sc.
10-12	95.	select a specific natural resource available to another country (Uranium ore in Mainland China, oil in the Mid-East, caviar in Russia, sugar in Cuba, etc.) and discuss the various impact of this supply on his life.	S.S.

Global Objective F: The student will examine optional courses of action and their consequences for improving the quality of life and will support those that will provide optimum short and long term benefits for himself, society and the environment.

Suggested Grade Level		Instructional Objectives: Provided with the necessary activities, experiences, data and information the student will:	Suggested Curriculum Areas
K-3	1.	demonstrate by groups and individual actions that their classmates' rights must be respected.	S.S.
K-3	2.	show by his behavior that he regards private ownership as a stewardship. (Should not encroach upon or violate the rights of others.)	S.S.
K-3	3.	explain why he feels the basic needs of life should also include truth, beauty, justice, love, and faith. (Give examples how each person may contribute to each of the above.)	S.S., Sc.
K-3	4.	give examples of situations in his home or community which provide comfort for each citizen.	S.S., Sc.
K-3	5.	differentiate between housing in his community which seems to be adequate and housing which is not.	S.S., Sc.
K-3	6.	identify ways in which their home or school community could be improved.	S.S., H.
K-3	7.	develop individual, class or school "action" projects that will improve the community environment. Some suggestions include: anti-litter drives; use both sides of a piece of paper; classroom flower garden; picking up trash along the street, etc.	S.S., Sc., A., L.A.

K-3	8.	"plan" a community using a sand table, diagram, or bulletin board which provides homes, work, food, water, waste disposal, etc.	Sc., A., S.S., H.
K-3	9.	show, through dramatization by puppets, the long range result of careless planning of a classroom, school or community.	L.A., S.S., H., A.
K-3	10.	explain good and bad land use practices after seeing pictures of land areas which have been harmed and/or unharmed.	L.A., S.S.
K-3	11.	suggest ways to correct an environmental abuse after either observing it directly or by photograph.	S.S., Sc., H.
K-3	12.	discuss reasons why laws have been established to reduce pollution, protect wildlife, protect flowers, etc.	S.S., H., Sc.
K-3	13.	suggest reasons wildflowers should be preserved for others to enjoy.	A., S.S., Sc.
K-3	14.	list and discuss sounds which he likes or dislikes.	Sc., H.
4-6	15.	react to the following situation: A man with a small farm on the edge of town cannot raise enough food to feed his cows and he cannot buy more land. What should he do and why?	Sc., S.S.
4-6	16.	infer human behavioral changes that may occur as people are crowed into urban areas.	S.S., Sc., H.

4-6	17.	predict future living problems in large cities if long range planning does not provide adequately for the humanistic needs of man.	S.S., H., Sc., L.A.
4-6	18.	suggest ways local people may be influenced to more completely appreciate and protect their environment.	S.S., Sc.
4-6	19.	plan and promote ways to develop individual and community spirit in highly polluted areas.	S.S., H.
4-6	20.	propose an urban renewal plan which will improve the environment in an inner city community.	Sc., H.
4-6	21.	demonstrate the difference between specific needs of man and specific wants that are not essential to life by dramatization, role playing, etc.	Sc., H., L.A., S.S.
4-6	22.	list types of pollution that infringe on the quality of life in his environment.	Sc., S.S., H.
4-6	23.	identify noise pollution sources in the school community.	S.S., H., Sc.
4-6	24.	group sounds from several locations as natural and man-made, pleasant or unpleasant.	Sc., H., M.
4-6	25.	infer the results noise pollution may have on people if it is not controlled.	S.S., H.
4-6	26.	demonstrate ways noise interferes with learning ability.	Sc., S.S., H.
4-6	27.	design and demonstrate a system for measuring intensity of sound.	Sc., H.

4-6	28.	propose feasible solutions to noise pollution problems in his community.	Sc., H., S.S.
4-6	29.	describe steps that are necessary to produce potable water at the faucet in his home.	Sc., S.S., H.
4-6	30.	give examples of how technology and proper management has restored land.	Sc., S.S.
4-6	31.	commend those responsible for improving environmental quality. (Techniques: poetry, letters, songs, stories, individual actions.)	L.A., M.
4-6	32.	condemn the bad things man has done to his environment. (Techniques: poetry, stories, songs, etc.)	L.A., M.
4-6	33.	suggest ways his community can improve and insure its beauty.	Sc., S.S., A.
4-6	34.	select an environmental problem, study it over a period of time and report findings to class.	Sc., H., S.S., L.A.
4-6	35.	describe how highways affect the use of land and discuss the aesthetic, economic and other effects of such changes.	L.A., S.S., Sc.
4-6	36.	develop a transportation plan for his community to alleviate many of its pollution and safety problems.	S.S., H.
4-6	37.	identify recreation areas in his community which may soon be unusable because of improper use, development, size, or contamination.	H., Sc., S.S.

4-6	38.	identify local practices which either destroy or enhance the beauty of the community.	Sc., S.S., H.
4-6	39.	explain why he feels aesthetic resources and recreational facilities are important factors in man's leisure time activities.	S.S., H., Sc.
4-6	40.	develop a photographic essay to show how man has marred or improved nature's beauty.	L.A., A.
4-6	41.	give examples of steps which might be taken to prevent or minimize pollution by the following: self, family, neighborhood, industry, towns, cities, counties, states, federal government, United Nations, nations of the world.	Sc., S.S., H.
4-6	42.	list the misuse or proper use of natural resources observed during a recent field trip.	L.A., H., Sc., S.S.
4-6	43.	survey the community to determine attitudes of individuals, farms, businesses or others about pollution control.	S.S., H., Sc.
4-6	44.	identify the major sources of pollution in his community and suggest ways to minimize problems.	H., Sc., S.S.
4-6	45.	explain whether or not new laws which are strictly enforced, a concerned citizenry, and new technology will enable man to reduce pollution so that a quality environment will be maintained.	H., S.S., Sc.
7-9	46.	write a dialog or play to illustrate how culture affects values and attitudes about environment using examples such as frontiersmen, Indians, farmers, city dwellers, etc.	L.A., S.S.

7-9	47.	defend actions and laws which promote such values and needs as love, comfort, understanding, positive self-concept.	S.S., Sc.
7-9	48.	investigate factors influencing man's attitude toward his environment and explain how man expresses these attitudes through many forms of communication (Consider verbal and nonverbal).	S.S., L.A.
7-9	49.	list ways in which a man-made problem in the local ecosystem has caused an imbalance affecting and violating the rights of others.	L.A., S.S., Sc.
7-9	50.	express his opinions about local ecologically unsound industrial practices in letters to appropriate individuals.	L.A., H., S.S.
7-9	51.	evaluate the local community zoning regulations in terms of their affects on the quality of life.	S.S., H.
7-9	52.	discuss environmental restraints which discourage people living in depressed areas from striving to attain their level of competence.	S.S., H.
7-9	53.	propose a flexible plan for orderly community development which adequately provides for human needs.	S.S., H., Sc.
7-9	54.	write and present a program illustrating how continuance of man's present life styles will affect the quality of life.	S.S., H., Sc., L.A.

7-9	55.	describe the adequacy of emission controls (smoke, fumes, solids, liquids) at one community industrial site based on data obtained by systematic observation.	S.S., Sc., H.
7-9	56.	present data on how industrialization may both positively or negatively affect areas.	S.S., H.
7-9	57.	inventory community recreational activities and predict the future of each based upon current environmental practices. (Example: Polluted lakes, misused parks etc.)	S.S., H., Ec., Sc.,
7-9	58.	evaluate whether science, law, technology and money will be able to solve environmental problems without changing peoples values and attitudes.	S.S., H., Sc., Ec.
7-9	59.	propose and implement a system for recognizing businesses which employ good environmental practices.	L.A., Ec.
7-9	60.	calculate water yield and water consumption for his county and relate this to projected water needs.	H., M., Sc.
7-9	61.	compare the quality of local surface water with rain water.	H., Sc.
7-9	62.	identify problems resulting from intensified agricultural production such as feed lots and enriched fertilizer.	V.A., H., Sc.

7-9	63.	explain the problems associated with flood plain usage.	S.S., V.A., H. Sc.
7-9	64.	relate land drainage practices to water supply, wildlife needs and CO_2 - O_2 balance in the atmosphere.	Sc., V.A., H.
7-9	65.	identify factors which cause lake eutrophication and suggest practices which will slow the process.	S.S., Sc., H.
7-9	66.	compare plant-animal communities in clean bodies of water with communities found in water in which eutrophication has developed.	Sc., H.
7-9	67.	conduct a study to determine the impact made by power boats on water.	S.S., H., Sc.
7-9	68.	identify the type of boat he would purchase today and justify this both economically and ecologically.	Ec., Sc., H.
7-9	69.	state environmental implications of using colored paper products.	H., Sc.
7-9	70.	evaluate adequacy to the local sewage treatment facility.	S.S., Sc., H.
7-9	71.	calculate the cost (per user) of adding tertiary sewage treatment for his or a nearby city and debate a resolution for such installation.	M., H.
7-9	72.	discuss current federal, state, and local laws which affect his community's method of sewage disposal.	Sc., S.S., H.
7-9	73.	list and explain precautions and management practices which must be taken to keep the water pure.	H., Sc., S.S.

7-9	74.	discuss economic and ecological reasons for future utilization of sea water.	S.S., Sc., H.
7-9	75.	analyze the merits of various modes of transportation that might be used in an urban area and propose a transportation plan for a nearby city.	S.S.
7-9	76.	debate the resolution: Billboard signs should be banned.	A., L.A.
7-9	77.	evaluate the "environmentalists" demands for anti-pollution devices in future automobiles.	S.S., H.
7-9	78.	test a plant's ability to grow in polluted air such as near a factory or traffic congested area.	Sc.
7-9	79.	assess the present balance in the CO_2 - O_2 cycle world wide and infer environmental stresses which may result from any imbalance of the system.	H., Sc., S.S.
7-9	80.	gather data about respiratory illnesses in the area and state a hypothesis about the cause of respiratory problems.	H., Sc.
7-9	81.	obtain information from two states on pollution control and present a comparison of these states in an art form such as a mobile or collage.	L.A., A.
7-9	82.	illustrate how future environmental problems can be alleviated through proper land use planning.	S.S., Sc., H., A.
7-9	83.	design a land use plan for his town or community which will maximize the quality of life.	S.S., A.

7-9	84.	analyze the life style of various occupational groups and discuss their implications.	S.S., Ec.
7-9	85.	choose an occupation which interests him and write a brief report explaining his choice and its potential relation to the quality of life.	S.S., L.A.
7-9	86.	write a short story about how man's manipulation of the environment can violate the rights of others.	L.A., S.S.
7-9	87.	express his opinion, in an editorial, on how increased leisure time has influenced change in land use in his community, county or state.	L.A., S.S., Sc., H.
7-9	88.	evaluate five new products he has recently seen advertised on television in terms of their potential impact on the environment.	L.A., Ec.
7-9	89.	prepare collages which depict pollution problems in his environment and proposed solutions.	L.A., H., A., Sc.
7-9	90.	describe problems which may result when a normal American community of 3,000 grows rapidly to 50,000 in the absence of a well developed land use plan.	H., Sc., L.A.
7-9	91.	state four activities of government which are aimed at improving health.	S.S., Sc., H.
7-9	92.	list habits he has which contribute to poor resource management.	S.S.
7-9	93.	propose a life style which he feels is ecologically sound in today's world.	S.S., H., Sc.

7-9	94.	write some governmental unit asking that action be taken to improve the quality of life.	L.A., H.
7-9	95.	discuss the merits of the statement: Bigger is not necessarily better, slower can be faster, and less can be more.	S.S., Ec., L.A.
7-9	96.	identify animals which have adapted and proliferated as a result of urbanization.	Sc., S.S.
7-9	97.	organize a collage or other art form which depicts leisure time activities contributing to environmental stresses.	A., S.S.
7-9	98.	give examples of physical and mental human resources being mismanaged.	S.S., H.
10-12	99.	photograph or sketch visual blight problems in his community and suggest a plan to alleviate each problem.	A., H., S.S.
10-12	100.	survey the community to determine why local parks are not being used.	H., P.E., S.S., L.A.
10-12	101.	prepare a presentation depicting the life of young people and adults from another segment of society.	L.A., S.S.
10-12	102.	prepare a report which summarizes growing psychological and sociological problems in urban areas.	Sc., S.S., Psy.
10-12	103.	gather and present data which describes the social and emotional effects of over-crowding.	S.S., H., Sc., Psy.
10-12	104.	prepare a report suggesting ways to improve the quality of life of inner city inhabitants.	S.S., Sc., H., L.A., Psy.

10-12	105.	write a dress code for his school which he feels is practical, ecological, and implementable.	H. Ec., S.S., H.
10-12	106.	identify and explain the conditions in his community which have made areas of it non-productive or un-livable.	H., S.S., S., Psy.
10-12	107.	gather data which shows that the presence or absence of natural resources greatly affects the quality of life.	Sc., H., S.S.
10-12	108.	write a description of what his community would look like with the removal of one resource.	L.A., H., S.S.
10-12	109.	write an editorial based on a community problem.	L.A., S.S., H.
10-12	110.	research and prepare a movie or videotape which explains a local ecological problem.	L.A., S., H.
10-12	111.	develop a display which depicts life-style changes in his community during this century.	L.A., S.S.
10-12	112.	write a paper or make a speech which identifies factors in his society that affects his values and attitudes.	L.A., S.S.
10-12	113.	design a program to correct a local environmental problem.	S.S., H., Sc., L.A.
10-12	114.	assess the zoning laws in terms of environmental considerations.	S.S., H.

10-12	115.	develop an inventory and construct a map of a downtown area showing rivers, parks, wildlife areas, aesthetic areas, trees, and other interesting natural features.	A., S.S.
10-12	116.	design a restoration plan for his city based on humanistic considerations.	S.S., A., L.A., H., Psy.
10-12	117.	prepare a traffic plan for his city which provides for the reduction of problems of traffic, noise, parking, etc.	S.S., H., A., L.A.
10-12	118.	sketch ways shopping center parking lots can be constructed to better utilize the natural environment.	S.S., A.
10-12	119.	design a plan to blend business signs into building design giving the city more aesthetic appeal and suggest ways to implement his plan.	A., S.S.
10-12	120.	develop a plan to beautify business and industrial areas in his community.	A., S.S.
10-12	121.	collect data on human behavior relevant to determining which of the following policies a city should follow in solving its traffic problems: 1. educate people on the need to use buses, car pools, etc. 2. provide a convenient mass transit system. 3. allow private automobile traffic to become unnavigable.	S.S., H., Sc.

10-12	122.	collect data to convince his classmates and community that city government must include environmental impact consideration in making decisions if environmental problems are to be prevented.	S.S., H.
10-12	123.	react objectively to: A country must constantly increase its Gross National Product to prosper.	Ec., S.S.
10-12	124.	identify a business or industry which employs a large number of people but whose operation causes considerable damage to the local and/or downstream - downwind environment and prepare a report outlining the economic, political and ethical considerations which its board of directors must evaluate in arriving at a decision to either close the plant or massively invest in additional pollution control devices.	S.S., H., Ec., Sc., L.A.
10-12	125.	debate the issue: An industrial company should voluntarily install pollution control devices in the absence of industry-wide regulations or agreements on emission levels.	Ec., Sc., H. S.S., L.A.
10-12	126.	formulate a plan for the construction of an additional needed major industry, utility or public installation in his community and develop an adequate environmental impact study for it.	S.S., H., Ec., Sc., L.A.
10-12	127.	secure a copy of an environmental impact study that has been submitted to the Environmental Protection Agency and evaluate its completeness.	S.S., Sc.

10-12	128.	identify both positive and negative environmental practices of local, federal and state highway agencies and suggest needed policy changes.	S.S., H.
10-12	129.	select a nearby construction project (highway, homes, schools, etc.) and determine whether the contractor and/or developer is adequately providing for the maintenance of the environment during the period of construction.	S.S.
10-12	130.	identify roles which governments, institutions, or other organizations can logically assume in repairing environmental damages.	S.S., H.
10-12	131.	debate the issue: Resolved the solution of environmental problems is the sole responsibility of science and technology.	Ec., L.A., H., S.S., Sc.
10-12	132.	calculate the effect of proposed nuclear power plants on water quality and usage if construction plans do not include anti-thermal and pollution devices.	H., S.S., Sc., M.
10-12	133.	explain the economic, health and ecological implications of city practices such as street flushing.	H., S.S.
10-12	134.	identify problems resulting from chemical, insect and weed control and suggest workable alternatives which will still provide an adequate national food supply.	V.A., H., S.S., Sc.

10-12	135.	map and explain why the development and location of America's largest cities depended on an adequate supply of usable water.	S.S., H.
10-12	136.	formulate inferences about the quality of the future of all life forms in the event that the nation's bodies of water are increasingly polluted by an increasing population.	H., S.S., Sc.
10-12	137.	compare dollar needs for cleaning up the nation's waterways to current local, state and federal appropriations available to municipalities for water treatment improvements and assess which components of these funds need to be increased.	S.S., H., Sc.
10-12	138.	list effects of polluted air on his life and the related economic and ecological impacts.	S.S., H., Ec.
10-12	139.	explain the "Green House" effect and elaborate on the possibility of it affecting weather change.	Sc., L.A., H.
10-12	140.	document air pollution as a direct effect of industrialization in any developing society.	Ec., H., S.S.
10-12	141.	give examples of pressures which can be applied to force industries to clean air.	S.S.
10-12	142.	acquire and study current air pollution legislation.	S.S., H., Sc.
10-12	143.	list food products normally consumed by his family that contain nitrates or nitrites.	Sc., H. Ec., H.
10-12	144.	prepare and publish a guide of recommendations for the treatment or handling of foods which are likely to be contaminated by insecticides or pesticides.	L.A., Sc., H., H. Ec.

10-12	145.	contrast an early colonist's value system with that of ours today in terms of land and resource use.	S.S., V.A.
10-12	146.	investigate religious and non-religious historical figures to discover the affects of religion on man's values and attitudes towards his environment.	S.S., L.A.
10-12	147.	contrast the Judeo-Christian philosophy to the Hindu philosophy with regard to man's stewardship/ownership role on the earth.	L.A., S.S.
10-12	148.	interpret his own feelings toward mankind and his environment by means of a collage, poem or skit.	L.A., Sc., S.S. A.
10-12	149.	write a paper describing relationships between a man's cultural, social or economic experiences and his values and attitudes toward the environment.	L.A., S.S., Psy.
10-12	150.	give examples of short-term gains that may well become long-term losses.	S.S., Ec.
10-12	151.	write a paper or give a speech illustrating the environmental ramifications of Pogo's statement: "We have met the enemy and he is us."	S.S., L.A., H., Sc.
10-12	152.	discuss implications of urban sprawl and the death of the inner cities.	S.S., H.
10-12	153.	evaluate various life styles and value systems existing in his community, nation and the world in terms of providing optimum short and long term benefits for himself, society and the environment.	

V. MODEL ENVIRONMENTAL EDUCATION UNITS.

When only objectives are provided, teachers often have difficulty in converting them into a program of student learning experiences. To get you started, four model units have been further expanded by suggestion one or more learning activities and related teaching aids for each objective.

One unit has been expanded for each of the grade level blocks used in classifying the objectives in Chapter IV, i.e., K-3, 4-6, 7-9 and 10-12.

In each of these units, one of the global objectives has been chosen and a series of instructional objectives selected. The suggested activities for the students listed in the second column hopefully will lead them to behavior stated in the objective.

Evaluation of student progress can be measured by asking the students (orally or in writing) to perform as specified by the objective. When students are unable to achieve the objective, the teacher should design a series of additional activities.

This procedure of selecting global objectives, instructional objectives, designing activities, on-going evaluation and modification of the activities based on the evaluation, is highly recommended.

Obviously, many exciting things will happen during the environmental encounters which will go beyond the objectives. Hopefully, students will get so involved in experiences that attitudes towards their environment will improve. Other affective and cognitive developments may also take place during the experiences.

These suggested units emphasize the process of learning from student fact gathering to the resolution of real community issues. They offer students an opportunity to make decisions based upon information and feelings required during relevant environmental studies. Remember, these are suggested units, so teachers and school districts should feel free to add, subtract, and substitute activities, as well as objectives, as they strive to implement a locally meaningful environmental education curriculum.

1. A K-3 Model Unit

Global Objective E. The student will demonstrate an appreciation for the interdependence of living things in the closed earth system.

Instructional Objective 1. Provided with the necessary activities data and information, the student will describe how people in his community are dependent upon other communities for food, clothing and shelter, e.g., consider grassland communities, oceanside communities, forest communities, etc.

Some suggested activities:

A. Have students trace the foods used in a single school lunch to communities where they were grown.

B. Have students collect pictures of traced foodstuffs while they are growing and/or being processed. If the source or processing plant is close by, take students to it on a field trip and have them take their own pictures.

C. Have students interview or write letters to people who raise or process the foods and ask questions about their processes.

Note: A similiar set of activities could be developed for the clothes the students are wearing, the houses they live in, the water they drink, the products they use in any one day, etc.

D. Have students imagine what their room would be like if we removed all the products from a given resource, i.e., forests, water, iron ore, clay, etc.

Instructional Objective 2. Provided with-----the student will describe ways in which man' presence in his community has produced changes from its original natural state. (construction of roads, bridges, houses, businesses, factories, etc.)

Some suggested activities:

A. After taking a walking tour through their community, have students develop a map of their neighborhood and locate predominant natural features on the map (rivers, lakes, hills). Then on the map draw in the predominant features that are man made (roads, bridges, railroads, houses, businesses, factories). On the map have the students identify their own homes.

B. Have students classify man-made features on the basis of function such as those used for transportation, shelter, food distribution, utilities, recreation etc. Have students imagine how their community would have looked before all the man-made features appeared. Have them draw pictures of what the school yard or some other area looked like at that time.

C. Have an old time resident of the community come in and describe what the community looked like when he was a student. Students can possibly identify changes that developed during that individuals life time.

D. In addition to the visual changes identified in the above activities students might close their eyes and identify sounds or odors that are man-made and sounds or odors in their community that are natural.

Instructional Objective 3. Provided with-----the students will learn to recognize some animals by name through pictures and infer from a picture of a set of animal tracks where it came from and what it might have done.

Some suggested activities:

A. Using a set of film strips or picture collections of both common, domestic animals and native, wild animals, the student should become familiar with the animals. The teacher should, whenever possible, substitute experiences with live animals for the vicarious experiences. Trips to farms, zoos, etc., or bringing small animals into the classroom, should be encouraged. (Remember, animals may include insects, reptiles, birds in addition to mammals.)

B. The class might develop a collection of plaster casts of animal footprints. Students could match the animal footprints with the picture and name of the animal.

C. After a main shower or new snow fall the students might take a walk in the community and look for animal tracks, tracing where the animal came from and where it went. They could also construct an inference of what type of animal it was and what it did. (The sets we would find in an urban area would not be the same as those we might find in a rural or suburban area.)

D. The teacher using a Polaroid or 35 mm. camera might take pictures of the animal tracks the students discovered for discussion in the classroom.

E. Students might draw sketches of the tracks they found and write a creative story about the animal.

F. Student tracks might be followed, also, and similar inference constructed. Children would follow the human footprints made on fresh snow or in some mud if the footprints had some unusual or readily identifiable characteristics.

2. A 4-6 Model Unit

Global Objective B. When faced with decisions concerning the use of earth resources, the student will choose practices developed in recognition of present and future environmental needs.

Instructional Objective 1. Provided with-----the student will select a local stream, bond, or lake and map the area draining into it.

Some suggested activities:

A. Define the term "watershed".

B. Have students locate on a map the sources of water for their community.

C. Take a field trip to a given area within the watershed and have students locate this area on the map.

D. Discuss drainage patterns noted during rain.

Instructional Objective 2. Provided with-----the student will explain the sources of water for the local watershed.

Some suggested activities:

A. Have the students explain in a class play how the water cycle benefits the watershed.

B. List the various kinds of precipitation which supplies water to the shed, i.e., rain, snow, sleet, etc.

C. Explain how man manipulating his environment has affected the source and quality of water supply for his watershed, i.e., compare the runoff from a paved area or large building to a grassy or natural area of the same size.

Instructional Objective 3. Discuss the natural and man-made problems of the local watershed.

Some suggested activities:

A. Photograph or draw pictures of environmental problems discovered during a field trip.

B. Write a story which describes how the life of a frog is affected by pollution.

C. Role play a citizen living in this community in the year 2000.

1. What will he use for water if this watershed continues to be contaminated.

2. What are some recreational activities now available which may be unavailable at that time?

3. If the water here is unusable, where in this solar system might man be able to go to find a usable source.?

Instructional Objective 4. Provided with-----the student will construct a series of food chains within the watershed and explain their importance for insuring a quality water supply.

Some suggested activities:

A. Ask students to respond to the following questions:

1. What is a food chain?

2. How do these food chains benefit you?

3. Can we do without them?

B. Visit the school library and local watershed to gather data and collect specimens for determining food chains.

1. Use the data and specimens collected to construct a series of chains.

2. Explain what would happen to the local watershed if one or more food chains were disrupted.

3. Write a short story depicting life in this community in the year 1990 after man has destroyed all food chains within the local watershed.

C. Ask the students to prepare a panel debate, class play, mock television program or multi-media program depicting how destruction of the local water supply food chains affects the quality of life for them and their community.

1. Photograph damages already evident.

2. Tape interviews with local authorities and citizens.

3. Compile a list of questions which students and citizens have about their watershed.

Instructional Objective 5. Provided with-----the student will compare plant and animal watershed life in the winter months to life in the spring.

Some suggested activities:

A. Take a field trip to a chosen area and observe it during different seasons.

1. List life found in warm seasons to life observable in winter.

2. Have students make inferences about what happens to different life forms during the winter.

a. Where have the birds gone?

b. What happens to frogs during the winter?

c. If we take a chunk of ice back to the classroom and melt it, do you think we may see different kinds of life?

d. If animals are living in the pond during the winter, how do they survive?

B. Have the students write and implement a class play which tells the story of a pond community's struggle for a balanced environment.

Instructional Objective 6. Provided with-----the student will explain how a heavy rain affects the soil, plants, animals and people in or around the watershed, i.e., fertilizers, pesticides, insecticides, oil, salt and sewage are often washed into the local watershed.

Some suggested activities:

A. Go outside during a rain and have students take notes on observations made.

B. Visit the local sewage treatment facility and ask what happens to sewage during a heavy rain.

C. Trace the runoff from a service station, farm or factory during or after a heavy rain.

1. What pollutants do you think were here before the rain?

2. Where did they go?

3. What affect do they have on the local water supply?

4. What suggestions do you have to improve this environmental problem?

5. Can we afford to continue these practices?

6. Are laws sufficient-----are they being enforced? etc.

Instructional Objective 7. Provided with-----the student will draw a map tracing water supplies from the school to its source.

Some suggested activities:

A. Ask the county surveyor or city engineer for a drainage map.

1. Locate the school on the map.

2. Draw a map which shows how water reaches the school.

3. On the map indicate where runoff water and sewage go after it leaves the school.

B. Follow their map to the point where the runoff water and sewage is discharged.

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C. Have them list the advantages and disadvantages of the present system.

Instructional Objective 8. Provided with-----the student will explain how the local water supply is treated and how this treatment affects the health, economics and recreation potential of the community.

Some suggested activities:

A. Ask the county sanitarian for information about the local water supply.

1. What are the problems?

2. What are projected needs?

3. Is the water treatment expensive? etc.

B. Photograph or collect pictures which demonstrate how water is used in his community.

1. In what ways is water being misused?

2. What suggestions do you have for reducing consumption of water? etc.

C. Survey the school to determine how wisely water is being used.

1. Develop a water use plan for the school.

2. Develop a water use plan for his home.

Instructional Objective 9. Provided with-----the student will construct several food chains from collections made at the watershed.

Some suggested activities:

A. Use dip nets and let students collect live speciemens. Locate a safe place for students to collect.

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B. Place specimens in collecting pans so students can make observations.

1. In what ways is each animal adapted for living in the water?

2. Where do you seem to be finding most life? Why?

3. Why can't you see all forms of life?

4. Why should we take samples of the water back to the classroom? etc.

C. Take microscopic specimens back to school and allow the students to observe them under a microscope, bioscope, etc.

1. Why did we bring these specimens back to school?

2. What can we learn from this study?

3. Why is small life just as important as large life? etc.

Instructional Objective 10. Provided with-----the student will write a creative story, poem or play which explains the value of food chains to an adequate water supply.

Some suggested activities:

A. Assign to each student one animal or plant in the watershed and have him prepare a report which explains its importance.

1. What is its function in or near the water?

2. What would happen to the water without this plant or animal?

3. What does it do for man?

4. What does man do for it?

B. Predict the consequences of a factory or housing project constructed near the water supply.

1. In what ways will this affect the water?

2. What are the environmental decisions which must be made to prevent destruction of the ecosystem?

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Instructional Objective 11. Provided with-----the student will write a description of the watershed.

Some suggested activities:

A. Have the students take various measurements of the watershed.

1. What is the temperature of the water?

2. What biological forms does the river or stream have?

3. How much sediment is there in the water?

4. How many man-made disturbances are there?

Instructional Objective 12. Provided with-----the student will deduce from above studies a number of probable causes for watershed degradation.

Some suggested activities:

A. Have the student preview filmstrips, films and study in textbooks and other materials, factors relating to stream degradation.

1. Have a representative from the Soil Conservation Service speak on the types of soils along the watershed.

2. Ask a member of the local planning board to speak on activities along the river.

3. Interview an older citizen of the community and record his description of the watershed thirty years ago.

4. Locate old and recent newspaper articles which describe the watershed past and present use and misuse.

Instructional Objective 13. Provided with-----the student will develop a plan for improving the watershed.

Some suggested activities:

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A. Discuss possibilities of what has been learned into a workable action plan such as:

   1. banks to hinder erosion.

   2. letters to government, industry, etc.

   3. write a plan of action to implement.

B. Develop an Ecological Water Use Plan for his life.

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3. A 7-9 Model Unit

Global Objective F. The student will examine optional courses of action and their consequences for improving the quality of life and will support those that will provide optimum short and long term benefits for himself, society and the environment.

Instructional Objective 1. Provided with -----the student will calculate the water yield and water consumption for his county and relate this to projected water needs.

Some suggested activities:

A. Have students secure data from which they can plot and calculate the average local annual rainfall for the past few years. Suggested sources: local weather station, records, U.S. Weather Service, newspapers, unofficial local sources, etc.

B. Have students obtain the official area of the county and calculate the amount of water falling on the county annually.

C. Have students collect and process data from which they can calculate or approximate the annual water consumption within the county.

D. Have students classify various types of water usages in the county.

E. Have students interview local governmental, institutional, and business authorities to determine projected changes in water needs for the county.

F. Have students extrapolate their graphs and/or other source of information to predict any projected change in local rainfall.

G. Have students analyze water sources used in the county to locate non-local precipitation supplies of water and estimate the effects that changing upstream environments may have on these supplies.

H. Have students write papers, prepare speeches, develop A-V presentations, etc., to report conclusion that they have reached concerning present and local water supply and needs.

I. Have students classify local water uses as to the water purity needs.

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Instructional Objective 2. Provided -----the student will compare the quality of local surface water with rain water.

Some suggested activities:

A. Have students collect samples of surface water (including streams and impounded supplies) at various times (immediately after shower, immediately after downpour, after drought, etc.) and analyze these samples for chemical and biological impurities.

B. Have students collect sample of rain water at various local sites and compare purities.

C. Have students compare purity of surface water collected at a given site with that of the rainwater sample collected nearby.

D. Have students infer causes of differences in purity of rainwater and surface samples.

E. Have students devise and implement a plan to test their inferences.

F. After having validated a cause of a localized water pollution, have the student suggest adverse and beneficial environmental effects of the pollution by answering questions such as:

1. Was the pollution source natural or man-made?

2. Does the pollutant help remove another pollutant from the water? Is this beneficial or not?

3. Does the pollutant provide nutrients for water life? If so, will this source of pollution cause an overpopulation of some species of water life?

4. If the pollutant had been reclaimed at its source, are there more advantageous uses for it?

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4. A 10-12 Model Unit

Global Objective C. The student will voluntarily become purposefully involved in activities regarding waste disposal problems.

Instructional Objective 1. Provided with-----the student will list types and amounts of solid waste on school site (in community).

Some suggested activities:

A. Tour area, take pictures and list types of S. W. observed, map locations with transparencies.

B. Set up a control test area for litter.

C. How much waste does the school produce daily?

Instructional Objective 2. Provided with-----the student will list sources of solid wastes and how it is disposed of.

Some suggested activities:

A. Trace the school waste.

B. Describe various present disposal methods.

C. Why were these methods selected?

D. List solid waste.

Instructional Objective 3. Provided with-----the student will describe the affect S. W. has on man's social, psychological and physical needs.

Some suggested activities:

A. Consult town reports.

B. How much does S. W. D. cost?

C. Interview various people, such as town manager, maintenance men, dump caretakers, etc., to determine costs, problems, etc.

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Instructional Objective 4. Provided with-----the student will identify and list federal, state, and municipal laws governing disposal of solid wastes.

Some suggested activities:

A. List federal, state, and municipal laws governing S. W. D.

B. Do they meet present day needs?

C. Which ones are obselete? Why?

Instructional Objective 5. Provided with-----the student will list authorities responsible for S. W. D.

Some suggested activities:

A. Develop an organizational chart.

Instructional Objective 6. Provided with-----the student will list acceptable methods of S. W. D. applicable to the area.

Some suggested activities:

A. Invite guest speakers such as soil conservationist, sanitary engineer, town manager, town planner, etc.

Instructional Objective 7. Provided with-----the student will select a method to resolve a solid waste problem if one exists on the school site.

Some suggested activities.

A. Conduct class discussion of alternatives.

Instructional Objective 8. Provided with-----the student will design a plan of action.

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Some suggested activities:

A. Consideration of school solid waste policy, delegation of duties, time schedules, etc.

Instructional Objective 9. Provided with-----the student will carry out a plan of action.

Some suggested activities:

A. Implement the solid waste disposal policy.

Instructional Objective 10. Provided with-----the student will analyze results of the action.

Some suggested activities:

A. What was the reaction to problem solution?

B. What further measures are necessary?

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ENVIRONMENTAL LEARNING OPPORTUNITIES - KEYS TO AN EFFECTIVE CURRICULUM

Consider carefully each of the environmental problems and then construct some notes on local examples of these problems of interest and concern to students at your grade level.

1. GREEN BELTS, NATURAL AREAS, LEISURE AND RECREATION.
   What groups are competing for use of local land areas? What are some needs which exist for Green Belts in your area?

2. WILDLIFE RESOURCES, ECOLOGICAL CYCLES AND CHEMICALS.
   What are some of the values and details of local plant-animal-energy cycles which could appropriately be used at your school level? How are the problem of recycling natural resources handled in your community? What chemicals which interfere with these cycles are commonly released in your community?

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3. POPULATION CONTROL-FAMILY PLANNING-FOOD SUPPLY.
What will be some of the effects of population growth on your community? What mathematical examples can be developed at an appropriate school level? What are natural mechanisms for regulating population size? What programs exist in the local community?

4. ECOLOGICAL PROBLEMS IN AN URBAN ENVIRONMENT.
What are the effects of long and short range planning? What land use conflict examples can be cited? How can or have some of these conflicts been resolved?

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5. SOLID WASTE DISPOSAL.
What alternative solutions have been proposed in the local community? What recycling efforts have been developed?

6. SANITARY WASTES AND WATER QUALITY CONTROL.
What are some of the problems associated with water quality control in the local community? How has water quality been controlled? How have the local groups been involved? What aesthetic, social, political and economic factors have been involved?

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7. AIR QUALITY CONTROL.
What are the factors in air quality and needs for control in your community? What human values are involved? How can students measure different aspects of air quality?

8. TRANSPORTATION AND LAND USE CONFLICTS.
What conflicts exist locally between transportation means and life style and limitation of resources? What attitudes are involved locally concerning private versus mass transportation?

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9. COMMUNICATION, NOISE, ADVERTISING, AND QUALITY OF LIFE.
How do local and metropolitan area stimuli affect the quality of life in your local community? What behavioral changes are prompted by the printed and electronic media?

10. POWER CONSUMPTION AND DISTRIBUTION AND ECOLOGICAL PROBLEMS.
How is the local power generated and where? What local groups are concerned with making these decisions? What environmental conflicts exist over power generation and power use?

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VI. LOCAL SCHOOL CURRICULUM DEVELOPMENT AND IMPLEMENTATION

A. Three Components of a Good Environmental Education Program

To maximize the impact of its environmental education effort, a school district should develop a total program composed of at least three components. The central components of these three is a curriculum which includes a sequential expanding program of learning experiences designed to develop specific attitudes, conceptual understandings and skills in problem identification and solution. These activities should be supported by a second component; that being a resource center where students and teachers can obtain materials and aids on a variety of environmental topics. They should also be supported by a series of sites at the school and in the community which can be used as learning environment and/or examples of environmental management.

(1) The Environmental Education Curriculum

The school district should have an overall curriculum design for accomplishing its goals in environmental education. This design would provide a framework around which to organize the total program, but it should not dictate the specific instructional activities on a day to day basis. Rather it should outline the objectives of the program and suggest possible activities and strategies for accomplishing these objectives, while permitting the teacher freedom in sequencing activities in terms of the individual student's development and interest.

The environmental education program should not become a separate discipline in the K-12 curriculum, but should be one focus of each of the current instructional areas of the school program. As each of these areas contributes to education for citizenship in humanity, it should include learning activities which lead to the development of wholesome attitudes and values about the human environment and related problems.

An effective environmental education program, therefore, would be one that is integrated into each school discipline; however, at the high school level, separate environmental courses, or mini-courses, may be developed for students who have a particular interest in investigating environmental problems in depth. On the other hand, a school system should not conclude that by introducing only such courses it is discharging its responsibility for providing environmental education. Such courses neither touch enough students nor provide an adequate sequence of learning activities for developing values sufficiently to promote a responsible environmental life style.

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The school system's environmental education curriculum development program should also include a definite plan for evaluation of the curriculum. This evaluation should not focus on the ability of students to regurgitate information but on how effectively the goals and the objectives of the program are being accomplished. The evaluation, therefore, should investigate the actions of students in regard to their approaches to environmental problems.

(2) The Resource and Enrichment Center

Each school system should develop an environmental education materials center. This center may be part of a centralized instructional media center, part of an environmental education facility or exist as a separate facility, but always it should enclude a wide variety of instructional materials which students and teachers can procure for resource or enrichment purposes. Types of materials available from the center should include: natural specimens, charts, books, maps, pamphlets, special field equipment, periodicals, films, filmstrips, slides, other audiovisual aids, etc.

(3) School and Community Site Development

A good environmental education will take students into the environment when appropriate. School sites offer an easily accessible learning environment where problems, projects, and other activities can become real and meaningful.

The local environmental education development program should involve a steering committee for school and community site development consisting of citizens, administrators, teachers, and students and special consultants or advisors. This committee would oversee the development of sites for educational use, environmental improvements such as landscaping and beautification, and community use such as natural outdoor recreational areas for citizens and visitors. Students involvement should be stressed in the development of these sites as i the selection of other sites in the community which may be used as examples of various environmental management practices.

B. Implementation of an Environmental Education Curriculum

The implementation of a comprehensive environmental education program will be facilitated by a district implementation plan. Some of the necessary components of an effective plan are: (1) an environmental education coordinator, (2) an environmental education committee, and (3) an in-service program for teachers. Each of these are discussed in greater detail below.

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1) Environmental Education Coordinator.

The Environmental Education Coordinator working part or full time in a school system is a key to implementing a total environmental education program. This co-ordinator:

a. Can provide continuity and coordination for an interdisciplinary K-12 program. He should have the background and time to keep abreast of community environmental plans and developments and coordinate their use into meaningful learning experiences.

b. Can provide a direct link between the school and community environmental education learning experiences and projects.

c. Can provide in-service teacher training and cope effectively with continuity problems should they occur because of teacher turnover.

d. Can contribute to meeting adult education needs related to community environmental education.

e. Can become a resource for students engaged in independent and group environmental studies and activities.

2) Environmental Education Committee.

A local environmental education committee provides a resource for the coordinator or, where no coordinator exists, provides for the direction and implementation of a program. It is recommended that where an overall school curriculum committee exists the environmental education committee be a working sub-committee under its direction. The committee should consist of local citizens, community officials, school administrators, teachers, and citizens. It would be helpful if the committee could have access to a consultant who has special training and or experience in environmental studies, particularly should such a person be available during the committee's early deliberations.

Among the committee's duties are:

a. Assist the school in preparing the basic philosophy, goals, and program structure. The state guidelines will provide many ideas.

b. Plan and participate in a comprehensive community environmental inventory upon which to base a K-12 environmental education curriculum.

c. Assist in the selection of and/or planning and developmental phases of school sites as environmental interpretive centers

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d. Assist in the organization and operation of an environmental education resource center for the school and community.

e. Assist in planning, organizing, and implementing teacher in-service programs for the development and implementation of a K-12 environmental education curriculum.

f. Develop a plan for implementing the program throughout the school district.

g. Assist in providing for evaluation and use of results.

h. Assist in acquainting the community with the environmental education program and in seeking community participation.

3) An Environmental Education Teacher In-Service Program.

One part of the in-service program might be a workshop designed to: 1) acquaint teachers with environmental education; 2) introduce them to objectives, possible activities and related teaching strategies, and 3) assist them in planning student learning activities which have "affective" impact.

Such a workshop program might be limited to a single session but would be more effective if spread over a period of time involving several sessions. One suggested organization of this type of workshop is given below.[3]

1. Introduction to environmental education

   a. The need
   b. Definition and major objectives
   c. Instructional objectives, activities and evaluation

2. Presentation of Objectives and curriculum structure

   a. Attitude development objectives.

      1) Affective
      2) Cognitive

   b. Skills and behaviroal processes

      1) Problem identification
      2) Decision-making

3. "Organization and Operation", Regional Environmental Education Center, Yarmouth, Maine, p. 9.

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c. Curriculum structure and teaching organization.

1) Suggested program sequence
2) Suggested teaching methods

3. Field experience

a. Community inventory
b. School site survey

4. Development of teaching strategies

(See Chapter III)

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VII. CURRICULUM RESOURCES

Many schools, publishing companies, governments and private organizations have already develop environmental information materials. The list is endless. Rather than listing every publication, the following lists of individuals and agencies which your school district may contact for free and inexpensive materials and services is provided.

		Cost
1.	Dr. George Parker Department of Forestry & Conservation Purdue University Lafayette, Indiana 47907 Ask for:	
	Environmental Education, Education for Seventies	Free
	This publication lists curriculum materials, films, pollution games, guidelines from National Education Association, lesson plans, resource agencies, etc.	
2.	Dr. John Moody Division of Education Indiana University, Southeast Warder Park, P.O. Box 45 Jeffersonville, Indiana 47130 Ask for:	
	"Free and Inexpensive Environmental Education Resource Materials for Elementary and Secondary Teacher."	$1.00
3.	National Education Association 1201 Sixteenth Street, N. W. Washington, D. C. 20036 Ask for:	
	Environmental Education Bibliography	Free
4.	National Wildlife Federation 1412 Sixteenth Street, N. W. Washington, D. C. 20036 Ask for:	
	Conservation Directory	$1.50

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		Cost
5.	American Camping Association Bradford Woods Martinsville, Indiana 46151 Ask for:	
	Lists of materials This agency has environmental education curriculm materials in their book store at Bradford Woods.	Free
6.	Curriculum Research and Development Center Indiana State University Terre Haute, Indiana 47808 Ask for:	
	Conservation Education Bibliography This publication lists free and inexpensive materials available to schools.	Free
7.	Science, Mathematics, and Environmental Education Information Analysis Center (SMEAC) 1460 West Lane Avenue Columbus, Ohio 43210 Phone No: 614/422-6446 422-4121	
	SMEAC, a subsystem of ERIC maintains a clearing house for environmental curriculum materials. Ask for information about environmental education programs and newsletters. When asking for information specify the particular problem for which you would like them to search their resource bank. Often a phone call is better than a letter since this allows the staff to identify the specific type of materials you need.	
8.	Hoosier National Forest 1615 "J" Street Bedford, Indiana 47421 Ask for:	
	Conservation Tools for Educators A curriculum guide for grades 10-12.	Free

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		Cost
	Teaching Conservation Through Outdoor Education Areas An excellent guide for developing an outdoor classroom.	Free
	Help for Environmental Education Programs Lists many agencies you can contact for environmental education materials.	Free
9.	Soil Conservation Service (Each county seat, except Tipton, has SCS office.) Ask for:	
	Teaching materials: a. Elementary b. Secondary	Free
	Teaching ideas for all subject areas	
	Outdoor Classroom An excellent guide for developing an outdoor laboratory or nature center.	Free
10.	Izaak Walton League 1800 N. Kent Street Arlington, Virginia 22209 Ask for:	
	Environmental Practices A book filled with environmental ideas and challenges.	$1.25
11.	National Audubon Society 950 Third Avenue New York, New York 10022 Ask for:	
	List of teaching materials	Free
12.	Division of Health Education Indiana State Board of Health 1330 West Michigan Street Indianapolis, Indiana 46204 Ask for:	
	List of materials	Free

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Cost

13. a. Joe E. Wright
Environmental Education Consultant
Division of Curriculum
Indiana State Department of Public Instruction
Room 108, State Office Building
Indianapolis, Indiana 46204

b. Michael Price
Environmental Education Consultant
Office of State Superintendent
Southern Regional Service Center
511 Fourth Street
Huntingburg, Indiana 47542

c. Jack Snell
Environmental Education Consultant
Office of State Superintendent
Northern Regional Service Center
635 South Main Street
South Bend, Indiana 46623
Ask them for:

1. Consulting services — Free
2. Workshops

14. Environmental Education
Office of Priority Management
Office of Education
400 Maryland Avenue S. W.
Washington, D. C. 20202
Ask for:

Environmental Education materials and guidelines — Free

15. Education Department
American Association for the
Advancement of Science
1515 Massachusetts Avenue N. W.
Washington, D. C. 20015
Ask for:

Science for Society - A Bibliography — $1.00

Almost 4000 references, many annotated, are included. All aspects of the interrelations of man, society, environment, science and technology are covered. Titles are classified and indexed in major and minor catagories.

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Cost

16. Mr. Jack Hart
Hayes Regional Arboretum
801 Elks Road
Richmond, Indiana 47374
Ask for:

Information about Project S.E.E. (SELF-EARTH ETHIC)

This K-12 interdisciplinary environmental education curriculum is being developed by the Hayes Arboretum staff, Indianapolis Public Schools, Ball State University and supported by the Indiana Department of Public Instruction.

17. Mr. Frank H. Bozarth
Assistant Executive Director
Indiana Tuberculosis & Respiratory Disease Association
30 East Georgia Street, Room 401
Indianapolis, Indiana 46204
Ask for:

a. Air Pollution Primer — Free
b. Air Pollution Experiments for Junior and Senior High School Students.

Excellent resource materials for teaching air pollution.

18. Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402
Ask for:

Environmental Education Programs and Materials — $1.00
Prep Report No. 33

Identifies and explains in detail the best on-going and available curriculum projects. An excellent investment for beginning or improving environmental education curriculum.

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		Cost
19.	Robert O. Ellingson Conservation Education Association Box 450 Madison, Wisconsin 53701 Ask for:	
	Conservation Education Bibliography	$1.50
	A compilation of the latest environmental resource materials, curriculum, etc.	
20.	Jerry M. Colglazier State Science Consultant Indiana Department of Public Instruction Room 108, State Office Building Indianapolis, Indiana 46204 Ask for:	
	Guidelines for Indiana School Science Programs K-12	Free
	This publication contains additional environmental education objectives. Your school has been sent a copy of this guide.	
21.	Soil Conservation Society of America 7515 Northeast Ankeny Road Ankeny, Iowa 50021 Ask for:	
	Plants, How They Improve our Environment.	$.25
22.	Conservation and Environmental Studies Center Whitesboro, New Jersey 08252 Ask for:	
	The World Around Them: Environmental Education in the Urban Environment.	$2.00
23.	Superintendent of Documents U. S. Government Printing Office Washington, D.C. 20402 Ask for:	
	Air Pollution Publications: A Selected Bibliography with Abstracts 1966-1968, 532 page paperback book	$4.50

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		Cost
24.	American Psychological Association 1201 Seventeenth Street, N. W. Washington, D. C. 20036 Ask for:	
	Environment and the Social Sciences: Perspectives and Applications	$5.50
25.	Contact your Silver Burdett representative to obtain information on the U.S. Park Service's NEED program, National Environmental Education Development.	
26.	Group for Environmental Education Inc. 1214 Arch Street Philadelphia, Pa. 19107 Ask for:	
	Our Man-Made Environment	Free
27.	National Education Association Publications-Sales Section 1201 16th St., N. W. Washington, D. C. 20036 Ask for:	
	Man and His Environment	$1.75
	An introduction to planning and using environmental study areas.	
28.	Teaching for Survival, a handbook for Environmental Education, by Mark Terry. Ballantine Books #02120-7-125.	$1.25

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